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A CASE FOR TRACHEOSTOMY

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The commonest indication for tracheostomy in the past has been mechanical obstruction of the respiratory tract in the region of the larynx and upper trachea. This operation is often performed as an emergency, in the presence of anoxia, and carries a high mortality, which is usually associated with the circumstances of the operation rather than with the operation itself.

During the past 10 years the frequency with which tracheostomy has been performed has increased considerably and there are now several other indications for which tracheostomy has to be considered.

Obstruction to ventilation may result from excessive secretions collecting in the bronchial tree. This collection of secretions occurs in patients who are unable to cough effectively or who are unable to swallow the secretions which collect in the pharynx. It may be present with varying severity in poliomyelitis, tetanus, unconsciousness, in disease of or injury to the nervous system, and after extensive surgical procedures. The value of tracheostomy in these cases lies in the facility with which secretions may be aspirated from the bronchial tree, and the assurance that a clear air-way will be maintained notwithstanding uncoordination of the muscles which normally maintain the functional patency of the entrance to the lower respiratory tract.

The above-mentioned pathological conditions are on occasions also associated with a decreased breathing capacity. For example, the excursion of the 'respiratory bellows' may be decreased in poliomyelitis because of weakness of the diaphragm or intercostal muscles, while in tetanus reduced breathing capacity will accompany spasm or exhaustion of these muscles. Tracheostomy reduces the resistance to breathing and permits effective ventilation to be carried on at a greater reduction in breathing capacity than when the expired gases have to be drawn through the nose or mouth, because of the elimination of half the 'dead-space' volume which occurs after tracheostomy.

Table I shows the indications and frequency of 155 consecutive tracheostomies performed at the University and

TABLE I. THE INDICATIONS FOR 155 CONSECUTIVE TRACHEOSTOMIES PERFORMED AT THE UNIVERSITY AND CITY HOSPITALS, CLEVELAND, OHIO, OVER A 5-YEAR PERIOD¹

	1948	1949	1950	1951	1952	Total
Poliomyelitis	0	0	7	5	39	51
Neoplasms	2	11	7	6	9	35
Laryngotracheitis ..	5	8	1	1	7	22
Miscellaneous	2	1	0	10	6	19
Central-nervous-system disease	0	0	2	6	11	19
Central-nervous-system injury	0	0	0	3	6	9
Total	9	20	17	31	78	155

TABLE II. SHOWING THE ABSOLUTE AND RELATIVE INCREASE OF TRACHEOSTOMY PERFORMED FOR SECRETORIAL VENTILATORY OBSTRUCTION AT THE BROOKE ARMY HOSPITAL, HOUSTON, TEXAS, OVER 8½ YEARS²

	Mechanical Obstruction		Secretorial Obstruction	
	No. of tracheostomies	% of total	No. of tracheostomies	% of total
1947.. ..	9	100	0	0
1948.. ..	12	92	1	8
1949.. ..	13	93	1	7
1950.. ..	16	76	5	24
1951.. ..	17	48	18	52
1952.. ..	20	44	26	56
1953.. ..	22	42	31	58
1954.. ..	29	37	50	63
1955 (6 months) ..	9	23	31	77

City Hospitals, Cleveland, Ohio.¹ Table II show the increase in number of tracheostomies performed for secretorial ventilatory obstruction compared with the number of tracheostomies performed for mechanical ventilatory obstruction in a series of 310 consecutive tracheostomies performed at the Brooke Army Hospital, Houston, Texas over 8½ years.²

The indications and technique for tracheostomy will vary from place to place and it is not intended to review these in detail but to mention briefly some aspects of the problems involved. Although acute ventilatory obstruction is apparent to the observer, chronic respiratory obstruction by tumours, stenosis or retained secretions may show less obvious signs of respiratory distress, nor may cyanosis be present. Prolonged under-ventilation will cause a respiratory acidosis which, with chronic mild hypoxia, produces a condition in which only very brief periods of additional respiratory obstruction are sometimes fatal to the patient.³ This condition is therefore to be diagnosed in its earliest stages and an elective operation performed.

In cases of secretional obstruction a general anaesthetic delivered by an endotracheal tube with a high concentration of oxygen allows a more deliberate and a safer operation than if the procedure is carried out under local analgesia, where a deliberate procedure may easily end as an emergency stab 'with the patient livid and the blood like tar'.^{3,4} When a mechanical obstruction is present, intubation may well be considered imprudent and a local analgesic used for the operation.

With regard to the technique, the isthmus of the thyroid is better divided and a segment of the anterior tracheal wall excised. These measures provide a safer and easier re-entry to the airway should the cannula be removed by accident or should it have to be replaced during the first few days.²

CASE REPORT

A Bantu female aged 23, was admitted with head injuries received in an assault. She was conscious, but investigation showed a very large comminuted, open, depressed fracture of the frontal bone, bilateral depressed fractures of the malar bones, and a fractured mandible.

An operation was performed under local analgesia supplemented with intramuscular pethidine and chlorpromazine. Un-

attached bony fragments were removed, consisting mainly of frontal bone and including the right supra-orbital ridge, orbital plate, and anterior and posterior walls of the frontal sinuses. A large rent in the dura mater was repaired with a fascial graft.

After closure it was noted that bubbles of air were coming through the suture line on top of the head on expiration, and that the whole area of skin in this region would lift on expiration. A tracheostomy was performed under local analgesia and the phenomenon described ceased.

Post-operatively the patient made an uneventful recovery. She was treated with sulphadiazine and erythromycin for 12 days and the affected area was irrigated gently with penicillin solution through two polythene tubes left in position for 3 days. The tracheostomy tube was removed after 2 weeks.

Comment

The possibility that infection may spread to the meninges and brain from the frontal sinus or upper respiratory passages after extensive fractures of the anterior cranial fossa is very real. In addition to repairing the dura mater it was a reasonable procedure to perform tracheostomy in order to avoid the constantly changing pneumatic pressures in the nose which occur during respiration and coughing, and so allow the tissues in this region to heal with as little disturbance as possible.

SUMMARY

The increasing frequency in the use of tracheostomy is noted and a variety of indications mentioned. A case is recorded in which tracheostomy was performed as an aid to the repair and healing of fractures of the anterior cranial fossa where a direct communication was found to exist between the sub-arachnoid space and the nasal cavity.

We wish to thank Dr. S. Disler, Superintendent of King Edward VIII Hospital, for permission to publish this case and Dr. H. Grant-Whyte for his interest and helpful criticism.

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EDITORIAL

CHRONIC HEPATITIS

On the whole, acute viral hepatitis is a benign condition with a favourable outcome, the vast majority of patients being restored to good health. However, several complications are recognized, the most serious being massive necrosis of the liver; if the patient survives this, he will develop post-necrotic scarring. Although diffuse fibrosis (Laennec's cirrhosis) is an uncommon consequence, it now appears that in England it is more often due to hepatitis than to alcoholism.¹

The meaning of the term 'chronic hepatitis' has long been debated. Very often it has mistakenly been applied to other conditions, e.g. post-hepatic hyperbilirubinaemia or established cirrhosis. It has now been investigated for some years by workers at the Walter and Eliza Hall Institute in Melbourne; they describe the entity as a condition where the patient has prolonged jaundice, pyrexial episodes, hepatomegaly and gross splenomegaly, spider angiomas, low albumin level and raised gamma-globulin level in the serum, and a high erythrocyte sedimentation rate.² In all cases they had histological confirmation of the diagnosis. Young women predominated in their series.

Joske and King³ later described the occurrence of the lupus-erythematosus (L.E.) cell phenomenon in this type of hepatitis; and others have confirmed this observation.⁴ Mackay *et al.*,⁵ from the same unit, have reported 7 cases of active chronic hepatitis in which L.E. cells were demonstrated; some showed other evidence of systemic lupus erythematosus (S.L.E.), but this was never gross. They have called this syndrome 'lupoid hepatitis'. The same workers performed liver biopsy on 7 cases of S.L.E. and encountered mild liver damage in only 3. This form of chronic hepatitis is thought to be related to S.L.E., though not to be part of the typical disease. It is suggested that in some cases of hepatitis the components of altered liver cells become antigenic and stimulate the production of antibodies that damage the liver and other tissues.⁵ As this type of reaction is known to occur in Hashimoto's disease, where the serum contains precipitins to thyroglobulin and thyroid tissue,^{6, 7} the suggestion seems reasonable, even though we do not know how and why the hypersensitivity comes about.

As cirrhosis develops, and becomes part of the picture, the

VAN DIE REDAKSIE

CHRONIESE LEWERONTSTEEKING

Oor die algemeen is akute virusontsteking van die lewer 'n goedaardige kondisie met 'n gunstige afloop; die meeste pasiënte herwin hul gesondheid. Verskeie komplikasies is egter bekend waarvan massiewe lewernekrose die ernstigste is; oorlewe die pasiënt hierdie verwikkeling, word na-nekrotiese littekens oorgehou. Hoewel verspreide fibrose (Laennec se sirrose) 'n seldsame gevolg is, blyk dit nou dat dit in Engeland meer dikwels deur lewerontsteking as deur alkoholisme¹ veroorsaak word.

Die betekenis van die woorde 'chroniese lewerontsteking' word reeds lankal beredeneer. Dit is reeds dikwels verkeerdelik gebruik om ander toestande soos bv. hiperbilirubinemie ná lewerontsteking, of gevestigde sirrose, te beskrywe. Hierdie siekte is gedurende die afgelope paar jaar bestudeer deur werkers aan die Walter en Eliza Hall-instituut in Melbourne; hulle beskrywe die siekte-eenheid as 'n kondisie waarby die pasiënt ly aan langdurige geelsug, koorsaanvalle, lewervergrooting en kwaai milt vergrooting, 'spinnepkop-vatgeswelle', 'n lae albumien- en verhoogde gamma-globulien-gehalte in die serum, en 'n hoë eritrosiet-besinkingspoed.² Hulle het by al hulle gevalle histologiese bevestiging van die diagnose verkry. Die meeste van die gevalle in hulle reeks was jong vroue.

Joske en King³ het later die voorkoms van die lupus-erythematosus (L.E.) sel-verskynsel by hierdie soort lewerontsteking beskryf, en ander werkers het hierdie waarneming bevestig.⁴ Mackay *et al.*,⁵ uit dieselfde groep, het 7 gevalle van aktiewe chroniese lewerontsteking waar L.E.-selle aangetoon was gerapporteer; by party pasiënte was daar ander tekens van sistemiese lupus erythematosus (S.L.E.) maar dit was nooit ernstig nie. Hulle het hierdie sindroom 'lupoid hepatitis' genoem. Hierdie werkers het ook 'n lewerbiopsie op 7 gevalle van S.L.E. uitgevoer en het ontdek dat daar by slegs 3 van die pasiënte ligte lewerbeskadiging was. Daar word gemeen dat hierdie vorm van lewerontsteking verwant is aan S.L.E., hoewel dit nie as deel van die tipiese siekte voorkom nie. Dit word voorgestel dat, by sommige gevalle van lewerontsteking, die bestanddele van veranderde lewerselle antigenies word en die produksie van teenliggaampies stimuleer wat die lewer en ander weefsels beskadig.⁵ Aangesien dit bekend is dat hierdie soort reaksie ook by Hashimoto se siekte voorkom, waarby die serum presipitiene vir tiro-globulien en skildklierweefsel bevat,^{6, 7} skyn dit 'n redelike voorstel te wees, al weet ons nie hoe of waarom die oorgevoeligheid ontstaan nie.

Met die ontwikkeling van die sirrose, en namate dit deel word van die siektebeeld, vererger die prognose. Behandeling met steroïede, wat oënskynlik aangewese is vanweë die

prognosis is poor. Treatment with steroids, which seems indicated in view of the likelihood of a hypersensitivity reaction, is, unfortunately, of little help; transient subjective and biochemical improvement often occurs, but the histological appearances remain unchanged.⁸

Another aspect of 'chronic hepatitis' has been considered by Bongiovanni and Eisenmenger, who describe a chronic hepatic disorder of unknown aetiology which again occurs mostly in young women.⁹ In this, jaundice starts insidiously and varies in degree over a prolonged period; at the same time signs of hyperadrenalism are noted, viz. hirsutism, acne, abdominal striae, obesity, amenorrhoea, mooning of the face, and high urinary corticoid levels. As in cases of 'lupoid hepatitis,' a high serum level of gamma globulin is the rule. In spite of the evidence of hypercortisonism the exhibition of ACTH has led to temporary improvement (a fall in the serum-bilirubin and serum-globulin levels, and a rise in the serum albumin). Some of the cases have developed typical Laennec's cirrhosis. The pathogenesis of the endocrine abnormalities is not yet established; a possible suggestion is that the liver in these cases is unable to degrade adrenocortical hormones.

It seems likely that these two syndromes^{5, 9} are expressions of the same disorder, for Wilkinson and Sacker⁴ have recorded a case of cirrhosis in a young woman who showed the features of both; at autopsy there was no evidence of S.L.E. This form (or forms) of chronic cirrhosis constitutes a rare disorder, but it is of great pathological interest, and it may well be that further studies of it will shed light on the pathogenesis of Laennec's cirrhosis.

moontlikheid van 'n oorgevoeligheid-reaksie, help ongelukkig maar min; daar is dikwels 'n vervlietende subjektiewe en biochemiese verbetering, maar die histologiese verskynsels bly maar onveranderd.⁸

Bongiovanni en Eisenmenger bespreek nog 'n aspek van 'chroniese lewerontsteking,' en beskryf 'n chroniese lewer-aandoening van onbekende oorsprong wat ook meestal jong vrouens as slagoffers tel.⁹ By hierdie aandoening begin die geelsug sluipend en varieer dit in graad oor 'n lang tydperk; terselfdertyd is daar tekens van oormatige bynierwerking soos harigheid, aknee, strepe op die buik, vetsug, amenoree, 'maangesig,' en hoë uriëngeltes aan kortikoïede. Net soos by gevalle van 'lupoid hepatitis' bevat die serum gewoonlik baie gamma-globulien. Ten spyte van die tekens van hiperkortisonisme, het die ekshibisie van A.C.T.H. tydelike verbetering meegebring ('n daling in die serumgehaltes aan bilirubien en globulien, en 'n styging in serumalbumien). By party van die gevalle het tipiese Laennec-sirroos ontwikkel. Die patogene van die endokrien-afwykings moet nog bevestig word; 'n moontlike voorstel is dat by hierdie gevalle die lewer nie in staat is om die bynierskors-hormone af te breek nie.

Dit is waarskynlik dat hierdie twee sindrome^{5, 9} uitings is van een en dieselfde steuring, want Wilkinson en Sacker⁴ het 'n geval van sirroos gerapporteer—'n jong vrou wat die kenmerke van albei getoon het—maar by die lykskouing was daar geen tekens van S.L.E. nie. Hierdie vorm (of vorms) van chroniese sirroos is 'n seldsame siekte, dog patologies baie interessant, en dit is heel moontlik dat verdere bestudering daarvan lig sal werp op die patogene van Laennec se sirroos.

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THE MEASUREMENT OF THE GRADIENT ACROSS THE AORTIC VALVE*

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The ordinary clinical methods of diagnosis of aortic stenosis are not always reliable, and since surgical treatment has become available, a need has arisen for a more accurate assessment.¹⁻⁵ Radiographic evidence of calcification of the aortic valve obviously ensures a definite diagnosis, but many cases will escape recognition if an anacrotic pulse and a harsh basal systolic murmur with thrill are deemed necessary

criteria.^{9, 10} Similarly there are other conditions in which a harsh basal systolic murmur (and thrill) may occur, leading to problems in diagnosis even to the most experienced.^{6, 11}

The characteristics of the peripheral pulse were first studied,¹² because of the importance of the quality of the pulse in the diagnosis of aortic stenosis.¹¹ It soon became clear, however, that although the pulse was of value in determining the diagnosis it provided no accurate quantitative information about the degree of stenosis present. The gradient

* A paper presented at the South African Medical Congress, Durban, September 1957.

across the aortic valve, which will indicate the exact degree of stenosis, can be measured by comparing the pressures in the left ventricle and the aorta. Several methods are available for measuring this gradient:

1. Retrograde arterial catheterization.¹³
2. Catheterization of the left auricle through the left bronchus.^{14, 15}
3. Percutaneous catheterization of the left auricle.¹⁶
4. Percutaneous catheterization of the left ventricle.¹⁷
5. Direct catheterization of the left ventricle and aorta after the chest and pericardium have been opened.

The last three methods were used in this study.

Material and Methods

All the patients were carefully studied in the Cardiac Clinic, where electrocardiographic, phono-cardiographic and radiological examinations were obtained. Intra-arterial studies were carried out in many cases. The group under survey consisted of 7 cases of aortic valve disease, 24 cases of mitral stenosis, and 5 cases of constrictive pericarditis. The procedures for recording the cardiac pressures were all performed in the operating theatre, usually under general anaesthesia. The exploring needle was connected to a capacity-type electromanometer (N.E.P.) by a length of polythene tubing with Luer-Lock fittings. The pressure waves were monitored on a twin-beam oscilloscope before recording them photographically on a six-channel N.E.P. apparatus. An ECG lead was recorded synchronously with the pressures. In addition, a plastic catheter of polyvinyl tubing No. 442 T was inserted through the needle and manipulated in the heart chambers. This catheter was connected to the manometer by a specially adapted fitting. The catheters were flushed intermittently to prevent clotting and damping of the curves.

RESULTS

1. Percutaneous Catheterization of the Left Auricle

Percutaneous catheterization of the left auricle was only performed in the cases of mitral stenosis, just before the thoracotomy for the valvotomy. The posterior percutaneous route developed by Bjork *et al.*¹⁶ was used. The patient was placed in the prone position, and a site about 2 fingers' breadth (4-4.5 cm.) to the right of the spinous processes in the right 7th or 8th intercostal space was selected. The point of an 18 T thin-walled stylet needle was then directed anteriorly and inclined at about 25° obliquely to the left, passing in front of the spine by a right paravertebral approach. The left auricle was usually entered at a needle-length of

10-14 cm., the emergence of bright-red blood being the indication that the needle was in the correct chamber.

Direct readings were taken of the pressures in the left auricle in 7 cases (Fig. 1). These readings were usually comparable with the pressures recorded from the left auricle at thoracotomy. Puncturing the left auricle was successfully accomplished in all cases, but not without considerable difficulty. Overt bleeding was slight. This minimal bleeding

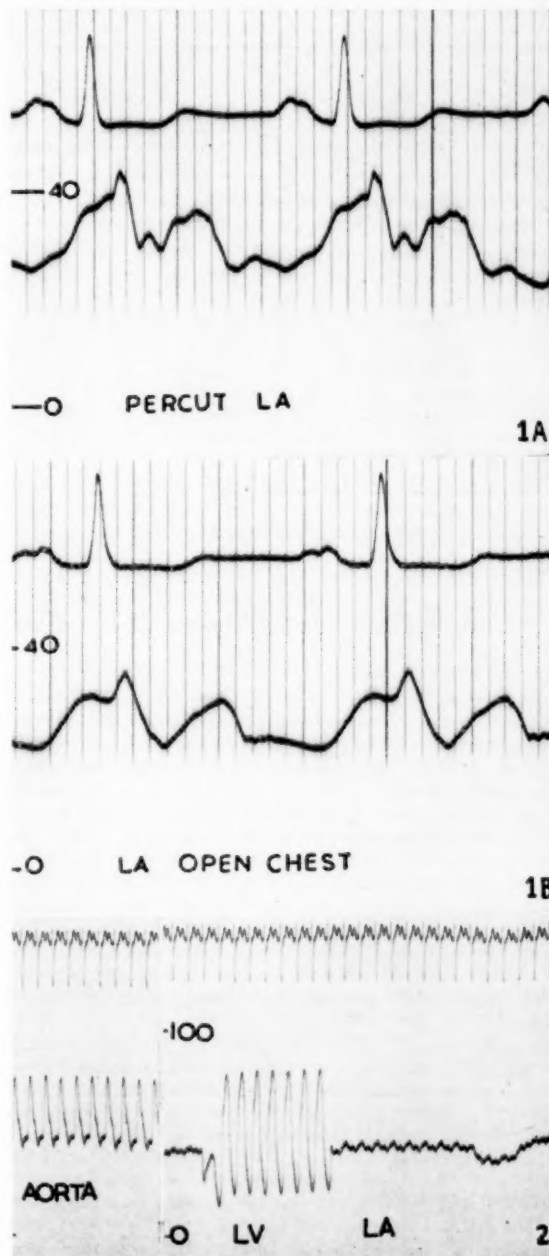


Fig. 1. Left auricular pressure records taken (A) percutaneously by the posterior route and (B) directly from the left auricle at open thoracotomy from a case of severe mitral stenosis. The curves show similar wave forms and pressures (taken at 80 mm. per second).

Fig. 2. Percutaneous catheterization of the left auricle, ventricle and aorta by the posterior route in a case of severe mitral stenosis. There is no gradient between the aortic and left ventricular systolic pressures (75/45 and 75/20 mm. Hg respectively). The left auricular pressure is very high (mean of 37 mm. Hg) and a considerable gradient (37-20 mm. Hg) exists between the left auricle and the left ventricle in diastole. The tracing is damped and taken at 8 mm. per second.

was confirmed when the pericardial sac was opened at subsequent operation. Bronchoscopy became necessary, however, in one case, before the thoracotomy, in order to remove blood clots. Difficulty was encountered in manipulating the plastic catheter after it had been passed through the needle into the auricle, because of coiling up in the chamber, particularly in the presence of grossly stenosed mitral valves. A typical pressure tracing is shown in Fig. 2. As damping of the pressure curves was a frequent occurrence, and the ventricle and aorta could not be catheterized with regularity, this method was abandoned. The passage of the needle into the left auricle was not observed under the fluoroscopic screen, as has been done by others.¹⁸⁻²³ Radner's method²⁴ of introducing a long needle behind the sternum down into the aorta, pulmonary artery and the left auricle was also not used.

2. Percutaneous Catheterization of the Left Ventricle

The anterior percutaneous route described by Brock *et al.*¹⁷ was the first method employed. The patient was placed in the supine position, and a site was selected 2 cm. below and lateral to the apex of the heart. A No. 18 gauge needle 12.5 cm. long was inserted at the apex and directed towards the 2nd right costo-chondral junction with a backward inclination of about 35°. The needle was advanced until the left ventricle was felt beating on the needle tip, at which stage the needle was inserted into the ventricle. Catheterization of the left ventricle was performed in 5 cases by this approach.

On several occasions the right ventricle was entered during the attempt to enter the left. Tracings taken through a catheter threaded through the needle and passed across the aortic valve were usually damped (Fig. 3). In order to overcome these difficulties the pressures in the left ventricle and in the brachial artery were recorded consecutively (Fig. 4).

The sub-xiphoid route provides a means of recording both right and left ventricular pressures (Fig. 5). The method has been described by Numy *et al.*²⁵ At first, prior to the puncture, a hard P.A. X-ray film was taken, to show the position of the xiphoid process and the heart border. A left lateral view was then taken with a series of metal markers placed down the mid-axillary line. The course to be taken by the needle was judged from these two films. The needle was then inserted near the xiphoid cartilage and directed towards the appropriate marker, which had been left *in situ* on the mid-axillary line. (With experience, markers were found to be unnecessary and their use was discontinued.) The needle was directed towards the centre of the right ventricle. Unoxxygenated blood issued from the needle when the right ventricle was entered, and the pressure, which was monitored, was lower than the systemic pressure. Consecutive pressures were immediately recorded from the brachial or femoral arteries.

Catheterization of the left ventricle was performed in 7 cases. The systolic pressure in the brachial or femoral artery should normally be the same as, or a little higher, than that of the left ventricle. In aortic stenosis, however, there is a considerable gradient between the left ventricle and a peripheral artery (Fig. 6).

3. Open Thoracotomy

The gradient was measured during thoracotomy in 17 cases. Consecutive left ventricular and aortic pressures were

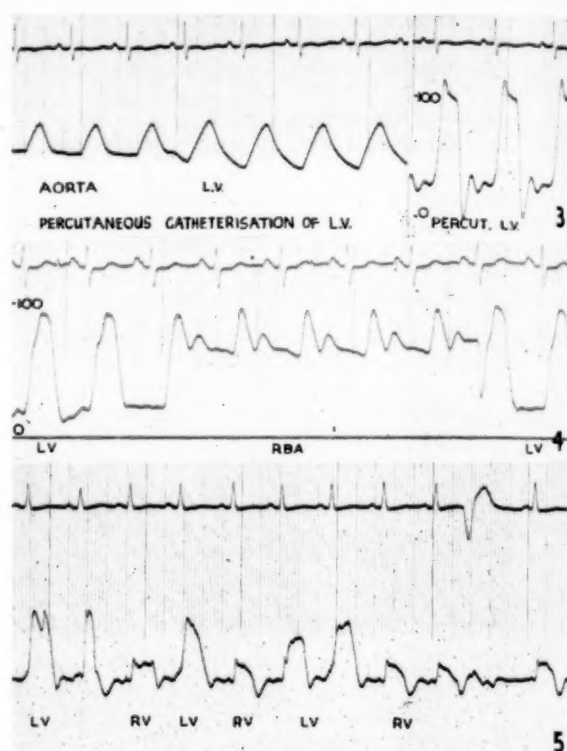


Fig. 3. Percutaneous catheterization of the left ventricle and aorta via the anterior percutaneous route in a case of constrictive pericarditis. There is no systolic gradient between aorta and left ventricle during the passage of a polythene catheter across the valve, but the tracing is considerably damped. The percutaneous undamped left ventricular pressure taken directly from the needle (112/0-25 mm. Hg) shows the diastolic dip encountered in constrictive pericarditis.

Fig. 4. Immediately consecutive pressures from the left ventricle via the anterior percutaneous route and the right brachial artery in a case of severe mitral stenosis showing no gradient between the systolic pressures (94/12 and 95/60 mm. Hg respectively). The pressures are recorded through a two-way tap with one needle in the left ventricle and one in the right brachial artery.

Fig. 5. Right and left ventricular pressure taken via the percutaneous sub-xiphoid route in a case of constrictive pericarditis. The needle is inserted through the ventricular septum into the left ventricle and then withdrawn into the right ventricle. The right ventricular trace shows the diastolic dip associated with constrictive pericarditis.

recorded. This procedure is necessary for cases known to require a mitral valvotomy but with suspected superadded aortic stenosis, for it may be necessary to perform an aortic valvotomy at the same operation. In two early cases, a polythene tube was passed into the aorta through an incision in the left ventricle, and the gradient was measured as the tube was withdrawn back into the ventricle (Fig. 7). Aortic stenosis had been suspected in both these patients. In one, no aortic valve disease was detected and in the other, surgery was contra-indicated because of an insufficient gradient and too much incompetence.

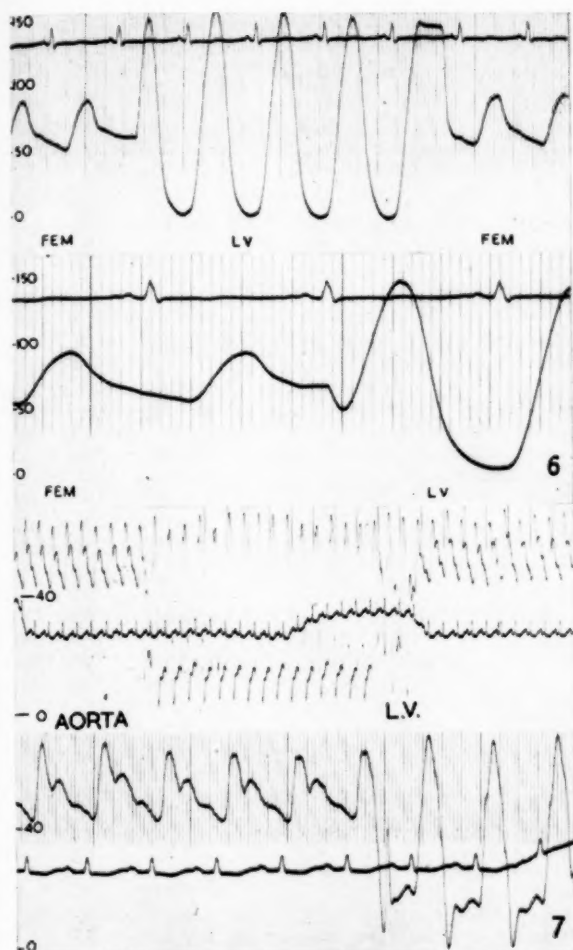


Fig. 6. Immediately consecutive pressures from the left ventricle via the percutaneous sub-xiphoid route and the femoral artery in a case of severe aortic stenosis. The aortic systolic gradient is 64 mm. Hg (aortic pressure 90/50, left ventricular 154/5). The anacrotic pulse is well shown in the fast record taken at 80 mm. per second, as is the symmetrical type of left ventricular pressure recording.

Fig. 7. Catheterization of the left ventricle and aorta during open cardiomy in a case of heart failure of unknown origin simulating aortic stenosis. There is no significant gradient between the systolic pressure in the left ventricle and the aorta. There is no prolongation of the upstroke in the aortic trace and the left ventricular record does not show the symmetrical limbs of aortic stenosis. The top tracing is taken at 8 mm. per second, the bottom at 25 mm. per second.

DISCUSSION

Catheterization of the right side of the heart is a routine procedure in all cardiovascular centres, but unfortunately it provides no information of the state of the left ventricle and the aorta. The successful development of aortic-valve surgery has rendered it imperative to determine the simultaneous or consecutive pressures in the left ventricle and the aorta or its branches. A simultaneous measurement of the

cardiac output is required to understand the significance of the aortic gradient.^{26, 10} This is particularly important where aortic stenosis alone is present. The calculation of the flow across the aortic valve is inaccurate when the stenosis is accompanied by aortic incompetence. Thus, a pressure gradient of 60-100 mm. of mercury may be found with dominant aortic regurgitation.^{27, 11}

The gradient across the aortic valve alone, was measured in this preliminary study. This procedure proved valuable in assessing the severity of the stenosis as an indication for surgical treatment. Needling of the left ventricle through the sub-xiphoid route was the simplest method, and pressures could be obtained which could be recorded consecutively with the brachial or femoral artery. Percutaneous puncture of the ventricles is not without danger, as we have seen. The pericardial sac usually contained some slight amount of blood after the procedure. An acute tamponade developed in one patient, and an immediate thoracotomy was required to relieve the haemopericardium. This investigation should therefore only be undertaken where adequate facilities exist for immediate thoracotomy and aortic valvotomy.

One other patient died suddenly a week after puncture, and although he had significant valve disease with severe symptoms, it was considered that the investigation may have contributed to his death.

Asystole and ventricular fibrillation have been described as a result of these investigations. One of our cases developed ventricular fibrillation and died as the local anaesthetic was being injected into the chest wall. This was a particularly severe and pre-terminal case, however.

Air embolism is a potential and avoidable hazard. Precautions must be taken to keep syringes and catheters completely filled with saline throughout the investigation. Chest radiographs were always taken after the procedures to exclude pneumothorax, haemothorax or haemopericardium.

CONCLUSIONS

1. Measurement of the gradient across the aortic valve is indicated in the assessment of the severity of aortic stenosis.
2. The method of choice is simultaneous or immediately consecutive measurement of the pressures in a peripheral artery such as the brachial or femoral artery, and the left ventricle.
3. The sub-xiphoid route is the method of choice for percutaneous needling of the left ventricle.
4. Simultaneous or immediate consecutive measurement of the aortic and left ventricular pressures is indicated during mitral valvotomy when co-existent aortic stenosis is suspected. This is best performed during thoracotomy.

We wish to thank the various members of the hospital staff for referring cases to the Cardiac Clinic. Our special thanks are due to the *Cape Times*, the Cape Town City Council and the people of Cape Town, without whose generous contributions the equipment used for this study could not have been acquired. We also wish to thank Mr. L. W. Piller for his technical assistance throughout the investigation. Part of the expenses for this work have been defrayed by grants received from the Council for Scientific and Industrial Research.

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A SCHEME FOR THE VALUATION OF ANAESTHETICS

ITS SCOPE IN TRAINING AND IN PRACTICE *

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The system of record-keeping which I propose to describe was evolved initially for my own personal use, but in my opinion it can be modified and extended with advantage, both in the sphere of anaesthetic training and in the practice of anaesthesia. I shall outline the steps which led to the use of this scheme in its present form.

Firstly, it is necessary to answer the pertinent question, 'Why bother to keep records?' The argument usually runs on the lines that during the course of one's training one administers thousands of anaesthetics and builds up a large body of experience, and that therefore the annotation of straightforward routine anaesthetics is so much wasted time, paper and effort. Now anaesthesia, as we all know, can offer great stimulation and satisfaction to the practitioners of the art—witness the large body of fine medical men and women attracted to this speciality. This is not the place to discuss the pros and cons of anaesthetics as a speciality but one must recognize these two aspects of the obverse side of the coin: (a) Dealing as it does mainly with unconscious patients, it can become largely a depersonalized speciality; and (b) a large proportion of the work can fairly be called straightforward and routine.

Now it seems to me that it is far too important and responsible a speciality to allow of the development and encouragement in the early training period of any irresponsible attitudes which would tend to increase the impersonal and routine aspect of the art. As 'guardians of mysterious waters' we have as our first duty to be keenly and always aware of our great responsibility to the patient.

It may be well here to comment on the extraordinary unreliability of the human memory, a failing to which I believe we are all liable. If asked for an example how many anaesthetics we give in an average month or year, we all remember the nights of intense activity and forget the week-ends off and the other quiet periods. Consequently our honest impression is usually far in excess of the facts. Similarly in considering a particular technique or operation we remember vividly, for example, the days of five or six

Caesarean sections per 24 hours and forget the succeeding two weeks that contained perhaps one or two Caesareans in all.

With these points in mind I was satisfied that it was desirable to keep some sort of record of my anaesthetic experience. It immediately became obvious, however, that it was useless merely to record lists of operations done. There must be a practical reason for the keeping of any statistical records. This was brought home to me strikingly when I wanted to classify the recorded operations so as to distinguish what could be called major operations. The assessment in retrospect of what was a major case was largely fallacious—neither my memory nor my wholly inadequate records could give any indication of the duration of anaesthesia, the agents and techniques used, and the difficulties or other special features of the case. In other words, I was far from deriving the fullest possible value from the experience which was being offered to me.

I then proceeded to record the nature and duration of each anaesthetic, but realized that little benefit was to be derived unless my records were considerably expanded. Similarly, without such record the consultant anaesthetists who head an anaesthetics department can have no true idea of how the registrars whose training is their responsibility are progressing. Total numbers of anaesthetics administered give no real indication; they may, for example, include an unduly high proportion of anaesthetics for simple 10-minute operations. Opportunities to administer anaesthetics for more 'major' or difficult procedures may not exist or they may not be grasped by the trainee. Reference to the official theatre register of operations is sometimes singularly unrewarding. All too often details of lengthy major anaesthetics are condensed there into the magic word 'Pent'.

THE CALIFORNIA SCHEDULE

The need exists, therefore, for a schedule of the relative value of anaesthetics given by an individual or in a department as a whole. For my personal use I adapted the Schedule of Relative Value Standards evolved by the California Medical Association. This schedule was designed to find a

* An address delivered to the Atherstonian Society, Durban, October 1957.

method of measurement to be used in improving fee schedules for all medical procedures. No attempt was made to lay down the actual money value of a medical service; this will obviously vary with time, place and circumstances. The aim rather was to assess the value of one medical service relative to another. For instance, if an appendicectomy is worth x pounds, what constitutes a reasonable fee for a radical mastectomy? A schedule translating these problems from pounds to relative unit values would be invaluable in improving the fee schedules under the Workmen's Compensation Act, medical aid societies, health insurance schemes, and private practice. Thus, if an appendicectomy could be expressed as so many units in value as compared say, to a mastectomy, then those relative values could remain constant for all scales of fees; it would merely be necessary for the controlling body concerned, be it W.C.A., medical aid society, or Medical Association, to decide the worth of a surgical unit, a medical unit, or any other unit. In California, different formulae were evolved to arrive at unit values in the four separate fields of (1) medicine, (2) radiology, (3) laboratory-pathology, and (4) surgery-anaesthesia.

To return to anaesthesia specifically, the traditional yardstick has long been the 'time basis'. It needs no illustrative examples to establish that this is quite unsatisfactory. It is obvious that some procedures require little skill but prolonged surgery, while others may demand the highest level of skill for much shorter periods. A formula was therefore evolved taking into consideration (1) the anaesthetic risk, (2) the surgical problem and (3) the skill re-

FORMULA

$$(\text{Anaesthetic risk} + \text{surgical problem}) \times \text{skill required} \\ + \text{anaesthesia time} = \text{relative unit value}$$

Examples

Radical mastectomy	$(2+3) \times 1 = 5 + 7 = 12$
Total lobectomy	$(3+4) \times 2 = 14 + 10 = 24$
Haemorrhoidectomy	$(2+2) \times 1 = 4 + 2 = 6$
Subtotal hysterectomy	$(2+2) \times 1 = 4 + 5 = 9$
Cholecystectomy	$(2+3) \times 1 = 5 + 5 = 10$
Excision of lobe of brain	$(3+3) \times 2 = 12 + 12 = 24$

quired of the anaesthetist, as well as (4) the time factor. Table I shows the factors involved. While I am not here concerned with fees, it is reasonable that an assessment of the value of an anaesthesia service should remain the same whether the purpose is for remuneration or not. I have therefore used this formula in recording all my cases, with one very important difference, as follows:

The American formula was *not* developed to determine the value of a specific anaesthesia procedure in a specific instance. It was not intended for use by an individual anaesthetist to estimate the value of his services in, for example, a cholecystectomy on a poor-risk patient where the surgery was difficult or prolonged. It was developed to establish the relative value of anaesthesia services in connection with cholecystectomies (for example) as a group, taking into consideration the good as well as the poor risk, the difficult as well as the average surgery, the slow as well as the fast surgeon—all of these factors being reflected in the assignment of units. In their anaesthesia study the relative values of each procedure represent the combined judgment of a group of experienced anaesthetists. The work of setting up values for some 1,300 procedures has been completed, and changes will be required when new procedures are introduced and others become obsolete. New methods applied to old procedures, whereby the risk, the surgical problem, the skill required and the time factor will vary, will call for revisions. Changes in fee schedules expressed in £. s. d. are difficult and often require years of work, reports and negotiation. Changes in fee schedules expressed in units can be readily accomplished after a review of relative standards.

From my own point of view, on the other hand, I was interested in the value of a specific procedure in a specific instance, because my concern was not standardization of a fee, but an assessment for my own personal use of the anaesthetic experience I was gaining and the skill I was being called upon to display.

AUTHOR'S ADAPTATION

The personal records which I keep at present are illustrated in Table II. (Note: Post-operative visits are made to all but the most minor cases. Notes on the use of intubation and any special features of difficulties are included in order to correlate with any post-operative complications, particularly regarding chest or larynx. In this way I hope to form opinions of the complications of anaesthesia based on direct observation rather than on hearsay.) Most of the column headings, including the abbreviations for anaesthetic agents, will be self-explanatory. The factors used in the formula are listed in order of anaesthetic risk, surgical problem, anaesthetic skill required, time in units, time in

TABLE I

1. <i>Anaesthesia Risk</i> . Factors:			
(a) Patient's physical status	Minimum	1	
(b) Degree of hazard imposed by	Average	2	
(i) Depth of anaesthesia required	Advanced	3	
(ii) Type of anaesthesia and technique	Maximum	4	
(iii) Potential complications incident to anaesthesia			
2. <i>Surgical Problems</i> . Factors:			
(a) Magnitude (not duration) of surgical procedure	Minimum	1	
(b) Degree of hazard imposed by	Average	2	
(i) Site of operative field	Advanced	3	
(ii) Position of patient	Maximum	4	
(iii) Potential complications incident to anaesthesia			
3. <i>Technical Skill required of the Anaesthetist</i> . Factors:			
(a) Problems incident to the maintenance of	Average	1	
(i) Normal respiratory physiology	Advanced	2	
(ii) Normal circulatory physiology	Maximum	3	
(b) Problems incident to specialized techniques and procedures			
4. <i>Anaesthesia Time</i>			
minutes	unit value	minutes	unit value
30	1	210	8
60	2	240	10
75	3	270	12
90	4	300	14
120	5	330	16
150	6	360	18
180	7		

TABLE II

Race and Sex	Number	Age	Ward	Operation	Anaesthetic Agents	Intratracheal Tube and Size	Anaesthetic Risk	Surgical Problem	Anaesthetic Skill required	Time in units	Time in minutes	Details and Difficulties	Post-operative Examination	Relative Unit Value
N (F)	12345	21	Mat.	Caesarean	Pent. Scol. Gas O ₂ Ether	Oral 8	2	2	1	2	45	—	Seen 24 hrs. Chest nil	6
N (F)	23456	26	Mat.	Caesarean	Pent. Scol. Gas O ₂ Ether	Oral 7	2	2	1	1	30	—	Seen 24 hrs. Rhonchi +	5
N (F)	24680	30	Mat.	Caesarean	Pent. Scol. Gas O ₂ Ether	Oral 8	3	2	1	4	90	7 pts. blood needed Bleeding	Seen 24 hrs. Chest nil	9
N (M)	11211	60	N ₂	Bronchoscopy	Pent. Scol. O ₂	—	2	2	1	1	10	—	Seen 24 hrs. Satisfactory	5
N (M)	22322	2	N ₂	Skin graft, Burns	Ethyl chlor. Ether	—	1	1	1	1	15	—	—	3
N (M)	22324	65	N ₂	Skin graft, Burns	Pent. Gas O ₂ Ether	—	3	1	1	2	60	Hb. 60% BP. 90/60 2 pts. blood	Seen 24 hrs. Fair	6
I (F)	6789	21	I ₁	D. & C.	Pent. Gas O ₂	—	1	1	1	1	15	—	—	3
I (F)	6665	3	I ₁	Abscess of foot	Ethyl chlor. Ether	—	1	1	1	1	5	—	—	3
N (M)	17863	27	N ₁	Decortication of lung	Pent. Tubarine Gas O ₂ Cyclopropane	Oral 10	2	3	2	7	180	—	Seen 24 hrs. Good	17

N=Native I=Indian (M)=Male (F)=Female

minutes and, in the extreme right-hand column, the relative unit value arrived at by the formula.

The examples used in Table II illustrate the flexibility of the assessment, the same operation yielding a different relative unit value in each case. The 3 Caesarean sections were performed by the same surgeon on the same day. In the first case adhesions from previous operations prolonged the operation time but the other factors (risk, surgical problems, anaesthetic skill required) were the same as in the straightforward second case. In the third case, however, a copious antepartum haemorrhage had increased the anaesthetic risk from 'average' to 'advanced' and the subsequent development of a bleeding condition (afibrinogenemia) prolonged the operating time to 90 minutes—both factors leading to the much higher relative unit value shown in the table.

The next example, a bronchoscopy, illustrates that even a 10-minute procedure can yield a relative unit value of 5 units, (i.e., it can be classed as a major anaesthetic procedure). The allocation of 2 units for anaesthetic risk and 2 for surgical problem is justifiable on the grounds that any procedure in which the anaesthetist must share the patient's vital airway with the surgeon must be of more than a minimum risk and minimum surgical problem.

The two skin grafts again illustrate varying relative unit values for similar procedures. The first example, in which the anaesthetic risk, the surgical problem, the anaesthetic skill and the time units are each recorded as 1, yields a relative unit value of 3, which is, of course, the lowest value ever yielded by the formula. In the second case, however, the area to be grafted was more extensive, the patient was anaemic, despite previous transfusions, the nutrition was poor and the blood pressure abnormally low. Thus, although the surgical problem remained the same (1 unit),

the anaesthetic risk was advanced (3 units) rather than minimal and the time was greatly increased (2 units). The resulting relative unit value becomes 6 as compared with 3 in the previous case. The distinction is more important than in the 3 Caesarean sections quoted, for the following reason: Even if the relative unit system is not used, anaesthetics for Caesarean sections are always regarded as major; but without the relative unit system, the second, bad-risk, skin-graft case quoted would unjustifiably be regarded as minor because the surgical procedure was admittedly a minor one.

The next two examples in Table II (dilatation and curettage, and abscess) are included to illustrate again the straightforward recording of unit values in these minor cases. The final example is a decortication for a post-traumatic empyema in a comparatively fit young man. The anaesthetic risk is average (2), the surgical problem advanced (3) and the technical skill required of the anaesthetist advanced (2), and the operating time is prolonged to 3 hours (7)—relative unit value $(2+3) \times 2 = 10 + 7 = 17$.

It will have been noted that the technical skill required of the anaesthetist is the only multiplication factor in the formula and therefore is the factor most responsible for really high relative unit values. The strictest criteria are therefore applied in its use. The use of a figure higher than 1 unit here is restricted to a minimum of cases, notably intrathoracic work. It may be worth noting that in the formula there is no 'minimum' assessment of anaesthetic skill. The formula pays the profession the compliment of regarding 'average' as the lowest grade of technical skill required.

A weakness in the scheme as I have adapted it is the fallibility, according to experience, in assessing the anaesthetic risk and anaesthetic skill required. This will obviously vary with the experience and judgment of the indi-

vidual anaesthetist. From this point of view, a system that works satisfactorily for personal use may lose validity when applied to the work of a department as a whole. The Californian formula has the advantage there of standardization, but it is coupled with a rigidity which I consider to be a disadvantage. However, it should not be impossible in a well-organized hospital department to establish a system whereby individual assessment is made on each case, the records being under regular scrutiny and supervision by the departmental heads.

CONCLUSIONS

A scheme introduced in America for the valuation of anaesthesia fees and accepted with approval by 90% of the anaesthetists concerned, has been described. Its adaptation for use in record-keeping by an individual trainee anaesthetist has also been noted. What are the possible applications of such a scheme in general anaesthetic training? They are as follows:

1. It would enable the standard of anaesthetic experience demanded by universities and colleges before permitting a candidate to sit for a degree or diploma to be greatly improved. To take an example from one South African university: Before writing the final examination a candidate must have administered 2,000 anaesthetics, at least half of which must have been for *major surgical procedures*. I have shown by examples that major surgical problems and major anaesthetic problems do not necessarily go hand in hand. Then is the anaesthetist in compiling his 2,000 cases to regard skin grafting as a major surgical procedure or not? In the tiny infant with extensive areas to be covered, or in the elderly debilitated epileptic with associated anaemia and malnutrition following the burn, the anaesthetic problem must be regarded as major, regardless of the assessment from the purely surgical point of view.

How then would the unit system be applied with advantage? The experience I have had with several hundred anaesthetics administered in a teaching hospital (King Edward VIII Hospital, Durban) obviously needs to be many times multiplied by myself and duplicated by others; but the following have been my constant and consistent impressions:

- (i) The average unit value per anaesthetic has been 5 units and
 - (ii) the number of anaesthetics totalling 5 or more units, has consistently been 3 out of every 8 administered. A university could therefore, in addition to demanding 2,000 cases, insist that these 2,000 should total not less than 10,000 units and that 750 cases (3/8ths) should be worth 5 or more units each.
2. Arising from the above suggestions, the total worth of anaesthetic work done in a hospital department can be compiled, and on this the following conclusions are based:
- (iii) The Medical Council could obtain an accurate criterion for deciding on the merits of a particular hospital for the purposes of recognition.
 - (iv) With the strict record keeping of anaesthetic techniques and the drugs used, and their sequelae, we could expect a greater number of valuable publications from our hospitals.
 - (v) The Society of Anaesthetists is strongly urged to consider the adoption of a relative unit value scheme for private, medical aid, and W.C.A. work, and so to arrive at tariffs more satisfactory to public bodies, anaesthetists and patients alike.

My warmest thanks for their advice and encouragement are extended to Drs. H. Grant-Whyte and J. T. Hayward-Butt.

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UPTAKE OF IODINE-131 BY AN 18-WEEK HUMAN FOETUS

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It is now widely recognized that the therapeutic and diagnostic use of radiation carries with it certain hazards both to the individual and to the species. These dangers are greater when exposure of infants or foetuses is involved, and have been experimentally demonstrated by work on animals. For example, Speert *et al.* (1951) administered ^{131}I to pregnant mice, and found that not only was the growth of the offspring retarded, but that fibrosis and adenoma formation occurred in the thyroid, followed later, in a large percentage of cases, by goitre formation and chromophobe adenomas of the pituitary.

The uptake of ^{131}I by human foetuses in the early stages of pregnancy has been studied by Chapman *et al.* (1948), Marinoni (1951) and Hodges *et al.* (1955), and has been shown to occur as early as at 14½ weeks of gestation. While these workers measured the uptake of ^{131}I by the foetal thyroid,

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the mass of thyroid tissue was not recorded, and therefore the specific uptake of ^{131}I per gram of thyroid tissue cannot be calculated.

Instances of the administration of therapeutic doses of ^{131}I to thyrotoxic pregnant women without termination of pregnancy are recorded by Chapman *et al.* (2 cases) and Hodges *et al.* (1 case), and in all three cases the offspring were reported to be apparently normal 1 or 2 years after birth. The ^{131}I was administered at 8, 19 and 24 weeks of pregnancy, and the impression is gained from these cases that the therapeutic use of ^{131}I at these stages of pregnancy carries little danger to the foetus.

At the Non-European Hospital, Johannesburg, the opportunity arose recently of studying the uptake of ^{131}I by an 18-week human foetus. The results obtained indicated that the administration of ^{131}I to a pregnant woman involves greater danger to the foetus than appears from earlier work, and the case is accordingly here reported in some detail.

CASE REPORT AND METHODS

Mrs. R.S., a 27-year-old African woman, was admitted to Baragwanath Hospital, Johannesburg, in November 1956 complaining of a painless swelling of the neck for 1 year, and a painful swelling over the sternum for 2 months. She had 2 children, aged 2 and 7 years, and her last menstrual period was reported to have been at the end of October. This menstrual history, however, was probably inaccurate.

On examination, a mass about 6 cm. in diameter was found in the left lobe of the thyroid, and a large, firm, tender mass was present over the upper half of the sternum. No signs of thyroid dysfunction were present. A biopsy of the sternal mass revealed a secondary carcinoma, probably of thyroid origin, and a total thyroidectomy was performed at Baragwanath Hospital on 26 November. The mass in the thyroid was found to be a carcinoma, and the patient was transferred to the non-European Hospital, Johannesburg, for radiotherapy.

On 18 December a tracer dose of 0.56 mC ^{131}I was administered orally, and a scintigram on 20 December revealed marked uptake by the secondary deposit over the sternum and no functioning thyroid tissue in the neck.

A *Xenopus* pregnancy test in December was positive, and it was decided to terminate the pregnancy before the administration of a therapeutic dose of ^{131}I . On 31 December the patient's cervix was dilated to size 14 Hegar under general anaesthesia and the foetal membranes were ruptured. However, the foetus did not abort.

On 3 January 1957 71.5 mC ^{131}I was administered orally, and the volume of the secondary deposit over the sternum was estimated with the aid of lateral roentgenograms and a plaster cast of the protuberant mass. The next day (4 January) the activity of ^{131}I in the mass was measured approximately, with the aid of a 'Tracerlab' Ionization-type Survey Meter (previously calibrated against a known quantity of ^{131}I) held at a known distance from the mass.

On 9 January the pregnancy was terminated by abdominal hysterotomy and an apparently normal 18-week male foetus delivered (crown-rump length 16 cm., weight 276 g.). The whole foetus was fixed in 10% formalin, and on 11 January the thyroid was carefully dissected out. The thyroid was weighed, and the radio-activity of the foetus, foetal thyroid, and placenta measured separately with an 'Ecko' Scintillation Counter.

Paraffin sections of the foetal thyroid were prepared, and autoradiographs made with 'Kodak' Autoradiographic Stripping Plate AR. 10.

RESULTS

The radio-activity of the maternal secondary carcinoma, the foetus, the foetal thyroid, and the placenta, is given in Table I.

TABLE I

	Weight	Activity	Specific Activity
Maternal secondary carcinoma	About 150 g.	About 40 mC	About 165 $\mu\text{C/g.}$
Foetus	276 g.	87 μC	0.315 $\mu\text{C/g.}$
Placenta	222 g.	58 μC	0.270 $\mu\text{C/g.}$
Foetal thyroid	100 mg.	38 μC	380 $\mu\text{C/g.}$

1. The foetus and placenta were weighed to the nearest gram, and the foetal thyroid to the nearest 5 mgm.

2. The activity of the maternal secondary deposit was measured on 4 January, i.e. 24 hours after administration of the ^{131}I . The activity of the foetus, placenta and foetal thyroid was measured on 11 January, i.e. 8 days after administration. No allowance is made in the table for radio-active decay.

Histologically, the foetal thyroid contained a few follicles enclosing deeply stained colloid. These more mature follicles were mainly situated peripherally in the organ, and most of the follicles present were immature and contained little or no colloid (Fig. 1). An occasional pyknotic nucleus was present, but no changes definitely attributable to radiation

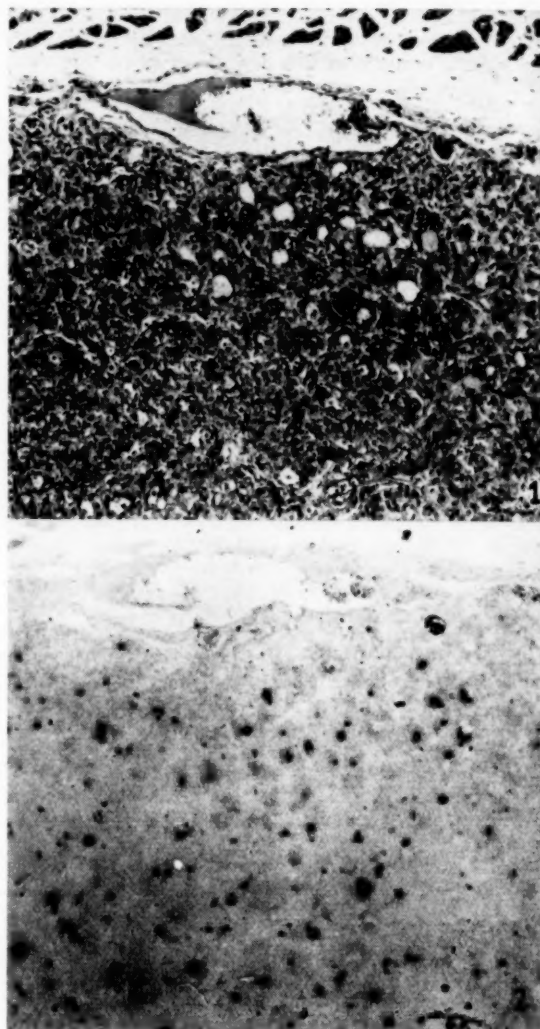


Fig. 1. Low-power photomicrograph of 18-week foetal thyroid, stained with H. & E. Note the presence of colloid in the more mature follicles, and the absence of colloid in many of the follicles.

Fig. 2. Photomicrograph of an autoradiograph of a similar section from the same thyroid. Note the marked uptake of ^{131}I by many follicles still in an immature condition.

damage were noted. The autoradiograph (Fig. 2) showed marked uptake of the ^{131}I by many follicles, including some that apparently contained little or no colloid. Where a follicle contained appreciable quantities of colloid, most of the activity was present in the colloid.

COMMENT

Histology and Autoradiograph

In view of the earlier unsuccessful attempt at termination of the pregnancy, the normal histological appearance of the

thyroid is important, since it has been shown (Trunnel *et al.*, 1953) that necrotic tissues take up more radio-iodine than any normal tissues except thyroid. The absence of signs of radiation damage is consistent with the work of Freedberg *et al.* (1952b), who found no histological changes in normal human thyroids 7 days after the administration of 17-20 mC of ^{131}I , a time at which there was likely to be already marked functional impairment of the gland.

Chapman *et al.* (1948) associated the onset of function of the foetal thyroid with the appearance of definite follicles containing colloid. In the present autoradiographs the radio-iodine is present not only in colloid-containing follicles, but also in immature follicles containing little or no colloid. This is consistent with the findings of Koneff *et al.* (1949), who reported organically bound iodine in the thyroids of foetal calves before the appearance of histologically detectable intracellular colloid or follicle formation.

Quantitative uptake of ^{131}I by the foetal thyroid

The uptake of the ^{131}I by the foetal thyroid, as compared with the rest of the foetus, is similar to that found by Speert *et al.* (1951) in foetal mice.

The dose of radiation in rads received by an organ containing ^{131}I is given by the expression

$$D = 14.45 \text{ At}, \text{ where } A \text{ is the initial concentration of the isotope in } \mu\text{C/g.}, \text{ and } t \text{ is the effective half-life, in days (de Valencé 1957).}$$

The effective half-life is some fraction of the physical half-life, and is a function of the loss of iodine from the tissue, in addition to the radio-active decay. It will be noted that in the present case the initial concentration of isotope in the foetal thyroid is unknown, and the only measurement available is the concentration 8 days after administration. The initial concentration 'A' bears the following relationship to the concentration 'a' 8 days later:

$$a = Ae^{-Kt}, \text{ where } e \text{ is the base of the natural logarithms, and } K \text{ is the decay constant given by the expression } Kt = 0.693.$$

Although the effective half-life is unknown, and the exact dose received by the thyroid is therefore also unknown, it can be calculated that the *minimum* dose received by the foetal thyroid is of the order of 80,000 rads. This dose corresponds to an effective half-life of 5.54 days; for any other value of the effective half-life the calculated dose would be larger. Of the assumptions implicit in this result the only one which is likely to increase the calculated result is the assumption that all the radiation emitted by the isotope in the foetal thyroid will act on thyroid tissue; in the case of a small mass of thyroid, a certain proportion of the radiation will in fact escape into the surrounding tissues.

A dose of 80,000 rads is far in excess of that which produces gross pathological changes in an adult thyroid (Freedberg *et al.*, 1952a and 1952b), and it is therefore extremely likely that the foetus, if allowed to live, would have suffered from thyroid dysfunction and perhaps other pathological changes as well (Speert *et al.*, 1951). It should be noted that the initial concentration of ^{131}I in the foetal thyroid was more than 4 times that in the maternal secondary carcinoma.

In comparing the above results with those of Chapman *et al.* (1948) and Hodges *et al.* (1955), several points should be considered, although their relative significance is hard to

assess. Firstly, in the previous cases the weight of the foetal thyroid was not recorded, and the dose of radiation is therefore impossible to calculate. Secondly, the dose of ^{131}I administered here for carcinoma of the thyroid was several times greater than that given to their patients for thyrotoxicosis. Thirdly, the percentage uptake of ^{131}I by local African patients has been found to be somewhat higher than that reported from some other parts of the world (Cohen, 1957), possibly reflecting a difference in the iodine content of the diets. Finally, as discussed by Hodges *et al.* (1955), the uptake of ^{131}I by the foetus in their series of cases may have been affected by the fact that the mothers were thyrotoxic.

APPENDIX

CALCULATION OF THE MINIMUM DOSE OF RADIATION RECEIVED BY THE FOETAL THYROID

$D = 14.45 \text{ At}$, where D is the dose in rads, A is the initial concentration of ^{131}I in $\mu\text{C/g.}$, and t is the effective half-life, in days (1).

$a = Ae^{-Kt}$, where a is the concentration of ^{131}I after 8 days, and K is given by the expression (2).

$Kt = 0.693$ (3).

From equation (1), substituting values of A from equation (2) and of t from equation (3), one obtains the equation

$$\begin{aligned} D &= 14.45 \text{ At} \\ &= 14.45 A \cdot 0.693 / K \\ &= 10K^{-1} a e^{Kt} \end{aligned}$$

$$\frac{dD}{dK} = 10 a K^{-2} e^{Kt} (8 - K^{-1})$$

= 0 for a maximum or a minimum,

where $K = 1/8$ for a minimum, and $t = 5.54$ days.

Substituting this value of t in equation (1) one obtains a value of D = about 83,000 rads.

SUMMARY AND CONCLUSIONS

71.5 mC of ^{131}I was administered to an African woman for carcinoma of the thyroid with secondaries. An 18-week foetus was delivered by abdominal hysterotomy 6 days later, and the foetal thyroid was found to contain enough radio-iodine to ensure a dose of radiation of at least 80,000 rads. By autoradiography ^{131}I was found even in immature follicles containing little or no colloid.

It is concluded that the administration of therapeutic doses of ^{131}I to women in this stage of pregnancy is unjustifiable, unless one is prepared to terminate the pregnancy.

This work was conducted under the supervision of Dr. P. Keen, Superintendent of the non-European Hospital, Johannesburg, and of Dr. L. C. Cohen, Senior Radiotherapist at the Johannesburg General Hospital. I should like to thank them for permission to publish this case. A supply of autoradiographic material was obtained through the courtesy of the Department of Botany, University of the Witwatersrand.

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THE HEALTH CARE OF HOSPITAL PERSONNEL*

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The term health is defined as a state of soundness of body and mind. The term personnel is defined as the staff or hands of an institution or service or business, as opposed to its equipment or plant. Both require care, but do not treat your staff as equipment.

Hospital personnel can conveniently be divided into professional and non-professional staff. In both sections different racial groups may be employed. In every hospital staff members are exposed to hazards not met with in everyday life, and therefore the health care of hospital employees must of necessity involve certain protective measures which are not generally adopted outside of hospitals.

Selection of Staff

We have compared equipment and staff. In the same way as you are careful in selecting your instruments and equipment so you should be careful in selecting your staff. Unfortunately, in many parts of the country, owing to man-power shortage, hospitals are compelled to employ persons who are not in any way really suitable for the particular posts they occupy, and who may in fact be suffering from ill-health.

Medical Examination. When possible, applicants should be examined at the hospital where they are to be employed before their acceptance. If this is not possible a medical certificate on the prescribed hospital form should be submitted by an outside doctor. The importance of a careful examination and past history cannot be too strongly stressed. Applicants are notorious for minimizing previous or existing ailments. If necessary confidential reports must be sought from outside sources. Hospitals should be as searching as insurance companies in the questions and examinations. A useful guide to accepted minimal standards is the Public Service circular on medical examinations. Applicants should not be rejected on medical grounds without careful assessment and consideration. In cases of doubt consultations with specialists should be arranged.

PROPHYLACTIC MEASURES

Having selected good healthy incumbents we must strive to protect them from the inevitable hazards of hospital life. These vary with the different types of hospitals, e.g. isolation hospitals, non-European general hospitals, tuberculosis hospitals, leper institutions, etc.

One must, of course, not forget the artisan staff and persons exposed to X-ray radiation. It is, however, the medical and nursing personnel who by reason of their number and greater exposure to infection, present most of the health problems.

X-ray Examinations

A routine chest X-ray should be done on enlistment and yearly thereafter in a general hospital. In a tuberculosis hospital or where staff deal with tuberculous cases in a general hospital this should be repeated at 6-monthly intervals.

* A paper presented at the South African Medical Congress, Durban, September 1957.

This is important both from the point of view of health protection and of indemnity.

Weight

All members of the staff should be weighed at least once a month and any undue loss of weight should be investigated.

Vaccination

In some hospitals revaccination is carried out as a routine, in others evidence of previous successful vaccination is accepted. In all non-European hospitals re-vaccination is a necessity. The technique is well known; it is advisable to clean the site with a quick-drying agent such as acetone so as not to inactivate the vaccine. Persons exhibiting 'reaction of immunity' need not be re-vaccinated.

Typhoid-Paratyphoid Inoculations

In non-European hospitals nursing personnel *must* be protected. In most European hospitals the incidence of typhoid is low, but in my opinion the inconvenience caused by the two injections is minimal and staff should be urged to avail themselves of the protection.

Technique. 0.5 c.c. of the typhoid and paratyphoid A & B vaccine (TAB) is injected subcutaneously and 2 weeks later 1 c.c. of the same vaccine. Before administering the vaccine the plunger must be withdrawn to ensure that no vein has been entered. It is advisable to inject the day staff in the late afternoon and the morning staff in the early morning. Severe reactions seldom occur and mild reactions can be slept off. It is not advisable to give 'injectees' A.P.C. tablets to take 'in case' they get a reaction; this may cause them to anticipate symptoms. In my experience the SAIMR products produce negligible reactions. It should be remembered that persons receiving TAB develop positive Widal's reactions within 2 weeks.

'Booster' doses of 1 c.c. of TAB may be given every year, or the full immunization may be repeated at intervals of 2 years.

Diphtheria Inoculations

Routine Schick tests are performed on all staff. Those exhibiting a positive test are given 0.5 c.c. of A.D.F. (adsorbed dissolved floccules) followed 6-8 weeks later by 0.5 c.c. of DF (dissolved toxoid-antitoxin floccules); both injections are given intramuscularly or deep-subcutaneously.

Yearly booster doses of DF should be given to those frequently exposed to diphtheria or alternatively yearly Schick tests can be carried out and positive reactors injected.

The technique of the Schick test is well described and illustrated in the pamphlets of the South African Institute for Medical Research (SAIMR). Briefly, 0.2 c.c. of heated toxin is injected intradermally into the skin of one forearm, as a control; and 0.2 c.c. of unheated toxin is similarly injected into the other forearm. Readings are made after 24 hours, and further readings on the 3rd and 4th days and in some cases up to the 7th day.

Interpretation. Very often after 48 hours no redness or reaction is seen on either arm; these cases are usually negative and need not be seen again. However where redness occurs on the toxin side, or on both sides, further readings at 72 or 96 hour intervals must be taken. In a true positive the redness on the toxin side is usually more marked and persists longer than the pseudo-positive reaction on the control side. Unlike the Mantoux test a *positive reaction indicates susceptibility (lack of immunity)*; that is to say, the toxin has not been neutralized by the subject's antitoxin.

Mantoux Test

Several tuberculins are marketed. The Koch's Old Tuberculin (SAIMR) and Purified Protein Derivative (Park Davis) are commonly used. The usual initial strength used with the SAIMR product is 1 : 1,000, which is injected intradermally. If negative the strength may be increased. Similarly the Park Davis product is used in different strengths; viz: 1st, 2nd and intermediate strengths. A positive reaction is indicated by a palpable induration of oedema 6-8 mm. in diameter. Readings should be made after 48 and 72 hours.

A positive test usually indicates immunity in the adult, but may of course indicate activity.

Negative reactors should not be posted to tuberculosis wards. Repeat tests should be done on them from time to time, and they should be regularly weighed and their blood sedimentation rates taken. If at any time they convert to positive they should be examined and X-rayed again and their blood sedimentation rate taken. According to the findings their hours of duty and rest may have to be completely revised.

B.C.G. vaccine is not, as far as I know, used very much in South Africa as a prophylactic measure.*

Poliomyelitis Immunization

It has been generally accepted that the value and safety of the Poliomyelitis vaccine as made by the South African Poliomyelitis Foundation is beyond doubt. Imported vaccines such as that made by Park-Davis have also been used in this country without any ill effects.

A recent analysis by Mitchell¹ in Cape Town showed that the incidence of poliomyelitis per 100,000 children under 10 was 464 in the unvaccinated and 33 in the vaccinated. This represents a 90% level of effectiveness.

At Addington Hospital a questionnaire was sent to the parents of the junior nurses asking if they wished to have their daughters immunized when the vaccine became available. While we were awaiting the supplies of vaccine the bloods of all the student nurses and, later, the trained nurses, were sent to the Poliomyelitis Foundation for examination for immune bodies. Those showing immune bodies to all 3 types or to types 1 and 2 were not subjected to immunization; the others were immunized according to the wishes of the parents.

The figures were interesting; in the junior groups 43% required no injections on the above basis and in the senior trained staff 63% were similarly immune. Only 4.9% exhibited no antibodies to all three types. There seemed to be no relationship to the presence of immune bodies in those

who had suffered 2 years ago in the outbreak of disease resembling Icelandic disease.^{2, 3}

Immunization is carried out by giving 3 subcutaneous injections each of 1 c.c. at intervals of 1 month between the 1st and the 2nd and 6 months between the 2nd and 3rd. In those known to be sensitive to penicillin 2 doses of 0.2 c.c. are given intradermally several hours apart. This process is repeated at the same time intervals as the routine method. The injections can be given during an epidemic. One nurse developed poliomyelitis 1 week after an injection, but she had been in contact with a proven case, unknown to herself. Before injection all subjects are questioned as to polio contact or penicillin allergy.

Before passing from special prophylactic measures to general measures I should like to mention some hospital departments that require particular attention:

1. *X-ray Department.* The importance of radiation hazard cannot be overstressed. In a large hospital the Senior Radiologist undertakes to check on the blood counts of his staff to ensure that they are not over-exposed to radiation. To keep a check on exposure, the staff may wear sensitive film 'badges' which are periodically processed and compared with a standard, or surveys of radiation scatter can be done by the Council for Scientific and Industrial Research.

2. *Kitchens.* The staff employed in the kitchens should be subjected to the usual routine examination, and in addition V1 tests should be carried out in order to exclude possible typhoid carriers. Scrupulous cleanliness should be insisted on and no member who leaves the kitchen for whatever reason, should be permitted to re-enter without washing his or her hands.

3. *Workshops.* All artisans and casual workers should be taught how to avoid accidents by word of mouth and by illustrations prominently displayed in the workshops. The importance of reporting accidents officially and making preliminary W.C.A. reports is obvious. W.C.A. reports should also be made on certain illnesses contracted in the course of duty; e.g. tuberculosis in a doctor, nurse, mortuary attendant, orderly or ward domestic.

4. *Laundry.* Care should be taken that potentially infective linen is not sent to the laundry before it has been suitably treated.

General Measures

Adequate accommodation and good food are essential for staff who live in. In some hospitals, living-out staff are compelled to take at least one meal a day at the hospital. Recreational facilities are equally important. Regular leave should be insisted on. Some Superintendents shield behind the dictum, 'Leave is a privilege and not a right'; but in my opinion leave should not be regarded as a privilege but a 'must'.

Hygiene. Every hospital should have a Hygiene Officer on the staff or, alternatively, one of the medical officers should be deputed to supervise the general hygiene of the hospital.

SICK STAFF

In a small hospital the responsibility for the health of the staff can usually be delegated to one particular medical officer. In a large hospital it is advisable and practical to divide the work among two or more medical officers all of

* For some years at the City Hospital for Infectious Diseases, the Brooklyn Chest Hospital and the Dr. A. J. Stals Memorial Sanatorium, Cape Town, Mantoux-negative nurses have been immunized with BCG as a routine measure.—Editor.

whom are available at the same time. Where possible the medical officer should be well experienced and of senior status.

Suitable consulting and examination rooms must be provided and sick parades should start at an early hour in the morning so that those who are fit to return to duty do not waste time waiting for the doctor. Facilities for sick staff to report for illnesses that manifest themselves after sick parade must also be available. The attitude, 'Get sick before 9 a.m. or wait till tomorrow', is a dangerous one that unfortunately exists in many hospitals.

The head of the department to which a sick member of the staff belongs (or a deputy) should be informed that the staff member has reported sick, and of other facts that he officially needs to know. The sister who assists the medical officer should report back to the head of the department at the end of the sick parade indicating the names of those admitted and those put off duty. The diagnosis should not be disclosed to all and sundry.

It is desirable that the services of consultants on the staff of the hospital be available; but all requests for consultations should be made through the medical officer who conducts the sick parade. In turn the report should be sent to him in the first instance. The staff doctor should be regarded as the family general practitioner who is always in the picture.

Ward accommodation, separate from the general wards, should, if possible, be provided for staff. Accurate records of all attendances, injections, reports, X-rays, etc., should be maintained. Staff in general and nurses in particular should not have access to their clinical records. However, as with any patient, an explanation of the diagnosis is essential.

Living-out staff who absent themselves because of illness should produce a medical certificate.

Personal Background. It is most important to get to know your staff. Have they any domestic worries? When did they last have leave? Are they afraid of the Sister in the ward in which they are working? Are they on day or night duty? Have they any pay queries that have not been settled? Are they really suited to the particular work they are performing? In short, are they happy in the service?

CONCLUSION

The object of a hospital administrator should be to keep down the staff sickness rate in his institution. In his work to this end comparative figures from other similar hospitals are useful. Measured in terms of sick pay alone the annual cost of staff sickness must be enormous.

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A HISTORY OF ANAESTHESIA IN SOUTH AFRICA*

H. J. SCHMIDT, M.B., CH.B., M.MED. (ANAE.)

When the Dutch East India Company sent out Johan van Riebeeck to the Cape of Good Hope it was with the intention of establishing a half-way station for their ships travelling between Europe and the East, so that the crews could be provided with fresh provisions for the long voyage which lay ahead of them. It took over 3 months for the sailing ships to arrive at the Cape from Holland. The ships' surgeons had a busy time in dealing with the many ailments amongst the passengers and the crew, because disease, especially scurvy, was extremely prevalent because of the poor diet and unhygienic conditions on board.

In 1656, 4 years after van Riebeeck established the settlement at the Cape, a hospital had been built for the treatment and convalescence of patients on the incoming ships. In subsequent years the accommodation in this hospital was found to be inadequate and bigger institutions were erected by van Riebeeck's successors. The Company hospitals admitted only their own employees, people who sailed on their ships or members of the military garrison.

In those days the Cape Colony had no medical men with a university education. The barber surgeons and surgeons, who had received their training by being apprenticed to a qualified man, alone represented the medical profession. Their knowledge, however, was limited. The barber surgeons knew only how to treat wounds, and the surgeons employed mainly bleeding and purgatives for most of the ailments with which they had to deal. Dr. C. P. Thunberg, who visited the Cape between 1772 and 1775, reports: 'Both in the hospital and on board their ships, the Company had, for the greater part, ignorant and unskilled surgeons; when a skilful surgeon was found he was a foreigner.'¹

Some 30 years later, in a book published by the Batavian Government in 1802, a list of the medicines and surgical equipment issued² gives some idea of the operations that could be performed. The list covers amputations, trepanning, herniotomy, excision of fistula-in-ano and extraction of teeth. Opium is the

only item with analgesic properties mentioned in this list, as would be expected from the date of its publication.

Further information can be derived from the records of a medical society which flourished in Cape Town from 1827 (or earlier) to 1847. On 2 November 1830 the members of this society laid down the following fees:

	£ s. d.	£ s. d.
For introducing bougie, probang, catheter, extracting teeth, cupping, bleeding, and minor operations	0 3 0 to	0 15 0
For the operations of hare-lip, hydrocele, excision of tumours, tapping, amputation of toes and fingers	0 15 0 to	2 2 0
For reducing fractures and dislocations	1 10 0 to	4 0 0
For capital operations, viz., hernia, amputation, aneurism, trepanning, lithotomy, extirpation of mamma, cataract, etc.	3 0 0 to	15 0 0

Other interesting features of medical work at that time are obtained from original papers presented at the meetings of this society, the titles of some being: (1) Rupture of bladder; (2) operation for spina bifida, successful; (3) abscess of liver opened (1829); (4) diffused femoral aneurism successfully treated by ligation of the external iliac artery (1833); (5) a report of a chemical analysis of Cape opium; (6) gangrenous sloughing ulcer, cured by opium, gradually increased up to 125 minims daily of laudanum.³

This gives us a glimpse of the events in those early days, but how was the pain associated with certain conditions and operations dealt with in the pre-anaesthetic era?

PRE-ANAESTHETIC ERA

Some knowledge of this period is taken from the writings published by laymen. Peter Kolben in his book *Caput Bonae Spei Hodiernum* (p. 568) relates that the Hottentots, one of the original tribes inhabiting the Cape, had their own barber surgeons. They were acquainted with the treatment of wounds and other injuries, with cupping and with bleeding. When one of their patients had abdominal pains, epigastric discomfort or chest pain they did not administer internal medicines immediately but first resorted to cupping. A cow or ox horn was cut, levelled and sucked to the area of pain until it caused the skin to become anaesthetic. The

* From the Department of Anaesthesia, University of Cape Town. Essay submitted in partial fulfillment of the requirements for the degree of M.Med. (Anaesthesia) of the University of Cape Town.

horn was then forcibly removed and the skin incised with a few cuts about half an inch in length. Subsequently the horn was reapplied over the incised area and kept in this position until it filled with blood and fell off on its own accord. The procedure took 2 or more hours depending on the depth and size of the cuts made.

When confronted with a woman in difficult labour they administered tobacco or dagga mixed with milk to hasten delivery. This probably had its beneficial effect by acting as a narcotic.⁴

This type of medication in obstetrics was not only used by the Hottentots. Kolben (p. 322) describes a case of obstructed labour, in which as a last resort Virginian tobacco was shredded into water and the mixture boiled, strained and cooled. After the patient had taken the fluid-extract by mouth, 'she was delivered of the child and of the violent pains'. One wonders what part the ganglion-stimulating effect of nicotine played.

When medical practitioners saw the need for producing insensibility they resorted to quite drastic methods, such as bleeding their patients or putting them into hot baths until they fell into a state of syncope. In others the same effect was brought about by forcible rectal injections of raw linseed oil. To relieve any muscular spasm they administered alcohol by mouth or, if necessary, by means of an enema.⁵

Opium was used with very much the same object in view as it is today, either as a hypnotic in the form of laudanum or as an enema in the form of opium crudum in cases of dysentery. It was also applied topically for localized painful conditions.

Although these methods and preparations were employed on occasions to alleviate pain, there is no indication of their having been used during operations. This has been pointed out by Dr. P. W. Laidler in his historical articles.⁶

Kolben (p. 636), who witnessed an above-elbow amputation in Cape Town in 1708, describes it as follows: The patient, who had his hand and wrist shattered by a gun shot, was brought to the operation room from the general ward and seated in a chair. The barber-surgeon made his skin incision and with three movements of the saw the operation was over. As the dressings were applied the patient exclaimed his astonishment on being shown the amputated arm. After having received a tonic and a heart stimulant he was returned to the ward but died a few days later from complications.

A very good account of an operation performed in 1845 is given by Dr. Henry Bickersteth in the January number of the *Cape Town Medical Gazette* of 1847, the first medical journal to be published in South Africa. It was a case of an aneurysm, in which the left common carotid artery was ligatured. The day before the operation the patient was bled (10 oz.) by venesection. After the bleeding he felt easier, the throbbing pain in the head had decreased and he appeared calm and prepared for the operation. In his article Dr. Bickersteth writes: 'The patient having been laid on the table with his shoulders raised, neck supported by a firm round pillow, and chin inclined towards the right side, the operation was commenced. . . . The man bore the operation, which lasted about eighteen minutes, most nobly, scarcely uttering a word or moving at all during its performance. He expressed no suffering when the artery was tied, but said he felt much relieved from the distressing pain in the head, of which he had previously complained.'

In the account of the post-operative period it is to be noted that on the 12th day, when the swelling increased in size and was tender to the touch, an opiate preparation was applied locally and a morphine mixture given to relieve the pain.

If these two descriptions represent the conditions of the pre-anaesthetic era in general, it would appear that the surgeons were inclined to operate on fully conscious patients and, rather than rely on drugs for the relief of pain, depend on the rapidity with which they could complete the operation.

SURGICAL ANAESTHESIA IN SOUTH AFRICA: 1847-1900

In South Africa 'laughing-gas parties' were quite a novelty in 1846. Members of the Cape Town Institute borrowed a room in the Town House in which they demonstrated the effects of the gas. The reactions of people, who inhaled the nitrous oxide from a bladder, varied considerably. In some the gas produced a state of hilarious intoxication, others became stupefied, and in a few the gas apparently had no effect. As these exhibitions provided great amusement, it was suggested they should be performed in public as a source of entertainment during the winter evenings.⁷ This to

some extent parallels similar occurrences described by Thomas Keys in his book *The History of Surgical Anesthesia*.

Ether

In the following year the Cape Town newspapers teemed with accounts from overseas of the use of sulphuric ether by inhalation during operations to produce insensibility to pain which, it was said, superseded even the pretensions of mesmerism. At this time public demonstrations of hypnosis were being held in Cape Town, and from India reports arrived of Dr. James Esdaile's work of operating on patients who were in a hypnotic state, a method which in later years was used with some success in South Africa.⁸ One of the newspapers⁹ referred to Dr. Henry Bigelow's address, which was the first extensive report to be made on ether anaesthesia, and was read before the Boston Society of Medical Improvement in November 1846. (Bigelow was one of the surgeons at the Massachusetts General Hospital.) The newspapers reported that in England Mr. Liston and other principal surgeons employed the inhalation of ether during operations, that the veterinary surgeons had equal success in their sphere of work, and that Professor Clemens of the College of Vevay, in experiments on plants, concluded that they could be etherized as easily as man and animals.¹⁰⁻¹²

The first of these reports appeared in April 1847, about 6 months after Dr. William Thomas Green Morton had given the first successful public demonstration of the use of an anaesthetic (ether) during a surgical operation, at the Massachusetts General Hospital on 16 October 1846.¹³

A published letter dated 24 April 1847 from Dr. Montgomery at Mauritius describes the effects of ether on a patient who was undergoing an above-elbow amputation.¹⁴ The dates of these reports in Cape Town are in keeping with the long time taken for news to travel from America and England.

A. Raymond

In South Africa, amongst the enthusiastic but sometimes also sceptical reports, there appeared in *'De Verzemelaar, id est: The Gleaner'* issued on 20 April 1847 the following small notice: 'Saturday last, an experiment was made by the Aether Vapour by Mr. RAYMOND Surgeon Dentist, having drawn from a Gentleman two teeth, and from an other one tooth, without causing any pain—we may therefore congratulate Mr. R. with the good result of his experiment.' This, as far as can be determined, was the first reported occasion on which ether anaesthesia was employed in South Africa.

Mr. A. Raymond described himself as a graduate from the University of Paris; he had his dental surgery in Cape Town at 27 Burg Street. In the following weeks he is reported to have used ether with great success, administering it from an inhaler, which is, however, not described. In one instance in the middle of May 1847 he extracted a carious tooth from the mouth of a mate whose ship was anchored in Table Bay at the time. After the extraction, with the patient still in the unconscious state, he removed a large wart from one of his fingers 'with a single stroke of the cutting forceps'. 'On the patient awakening, Mr. R. expressed a hope that he had not taken too great a liberty by so doing. "Far from it, Sir", he replied, "you have rendered me very great service I should long since have had it taken off, could I have been sure, as now, of its being wholly unattended with pain".'¹⁵

From the newspapers^{16, 10} one is tempted to conclude that the gentleman from whom Mr. Raymond was reported in *De Verzemelaar* to have extracted the two teeth was a medical practitioner. His description of the experiment was as follows: 'A general thrill pervades the body to its very extremities at first, and there occur a series of, as it were, electric discharges in the brain—no better simile is at hand. These feelings give way to a dreamy state, in which external objects partly enter and partly appear excluded: to this follows an utter forgetfulness of everything. The soul appears to have cast off his earthly clog, and to be wandering it knows not where: in a word, there is a complete loss of individuality, a feeling as if one were another person altogether. At this time the operation was performed—the first tooth being extracted without a trace of pain, though it appeared to disturb the lethargic state, so that a dull pain of a trifling nature accompanied the removal of the second. Shortly afterwards the writer awoke, discovering, to his complete amazement, two grim looking teeth on the table at his side. No ill effects followed.'

In the same article he writes that he himself, in association with

others, had successfully experimented with ether, and concluded that this was the liquid which had been used in Boston by Morton. (Dr. Morton did not disclose the true nature of the substance at the time, because he originally had intended to patent his discovery.) The practitioner then goes on to describe some of the observations made in connection with ether anaesthesia. At first the patient almost invariably held his breath and coughed but afterwards becoming accustomed to the vapour breathed quite vigorously. Then followed a period of excitement, which passed off if the inhalations were continued to the point where there was a loss of reflexes and muscular tone, which indicated the stage at which to start the operation.

To carry on in his own words: 'In this unconscious condition the patient will then remain for about three minutes; but it is at the option of the operator to prolong the narcotism to fifteen, twenty or even thirty minutes, without inconvenience to the generality of patients. Thus the most tedious and severe operations of the surgeon, which seldom exceed twenty minutes, and are generally of a much shorter duration, are capable of being performed during the state of insensibility. The most curious circumstance perhaps is that the patient awakes from his lethargy almost at once; but for some hours after, he experiences an unusual buoyancy of spirits, which only evaporates with the ethereal odour itself. In a considerable number of experiments the loss of sensation seems general, but the effects of the vapour are very various.'

He further describes the new remedy as: 'Simple, obvious, free from all show of mystery—except so far as the physiological action of the ether is concerned—the discovery has, in the course of a few months, established itself in the faith of the public as thoroughly as the discoveries of Jenner, Harvey, and the other masters of medical science. It is true that different operators may meet with different success, according to the perfection of the apparatus employed and the susceptibility of the patient; but this is no more than what attends the introduction of every new process—experience and certainty can only be acquired by an enlarged experience.'

So much for the write-up by the unidentified medical practitioner, which appeared in the *Cape Town Mail* of Saturday 26 June 1847.

Henry Anderson Ebdon

Other evidence that experiments with ether had been carried out in Cape Town since April 1847 is found in the *Cape Town Medical Gazette*, of which Dr. Henry Anderson Ebdon (Fig. 1) was the editor. In the editorial of the July number (written in the editorial plural) the investigators describe the apparatus which they employed in the early trials. Later, however, they used a

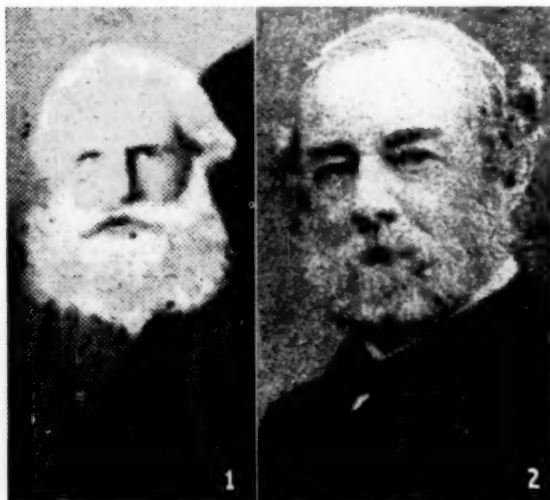


Fig. 1. Dr. Henry Anderson Ebdon.
Fig. 2. Dr. William Guybon Atherstone.

'Smee's' apparatus in which valves prevented the mixing of inspired and expired gases. This provided greater comfort to the patient, making respiration very much easier. It seems likely that this greater comfort was due in part to the lower concentration of ether vapour and the avoidance of re-breathing and consequent carbon-dioxide accumulation. The experimenters, on inhaling the ether themselves, noticed no difference in the induction time when either of the methods were employed. The experiments with ether caused insensibility to pain in all except two or three cases. In these, failure was attributed to extreme nervousness of the patient, and either to a poor quality of ether inhaled or an irregular working of the apparatus. As it was deemed to be an important acquisition to surgery, it was urged that the profession of the colony gave the new discovery a full trial. It was suggested they use an apparatus similar to their original one, which consisted of a large bullock's bladder containing a 2-inch-square piece of sponge soaked in 1 oz. of pure ether and fitted with a tin mouth-piece, which would cover the lips and the angles of the mouth. The bladder should then be semi-inflated with air and the nose of the patient firmly closed on each inspiration. It was considered that the desired effect would be produced within 3 minutes and, in the extreme, within 8 minutes. It was also suggested that the inhalation of the ether might prove itself to be a valuable palliative, and sedative agent in the treatment of spasmodic asthma and in bronchitis of old people.

The next quarterly issue of the *Cape Town Medical Gazette* reported that failures in producing anaesthesia with ether had also occurred overseas. The editorial presumed that it might have been due to the indiscriminate use of the agent, and proposed that the administration should be restricted to patients who did not suffer from head and chest diseases or who were not addicted to opium and brandy. It further relates that 2 amputations had been performed in Cape Town since the last issue of the journal. In the first operation, on a woman of 55 years with arteriosclerosis and in a poor state of health, the patient noticed that the amputation was in progress when she heard the saw passing through the bone. In the other patient, although insensibility to pain had been produced the day before the operation, this degree of success could not be obtained during the actual amputation because of a defect in the apparatus employed. Other reports seem to indicate that the practice of 'trial inhalation' the day before operation was not infrequent.

J. Esterhuysen

Not only did man benefit by the new discovery, but it was also used with advantage in operations on animals. In a communication from Stellenbosch dated 10 May 1847, it was reported that Mr. J. Esterhuysen removed a tumour weighing 2½ lb. from the lower eyelid of a horse whilst the animal was under the influence of sulphuric ether. The apparatus he designed was simple, practical and effective. A sheet of wax cloth was rolled to form a cone. The wider end was fixed around the muzzle of the horse and the other end was attached to the ether bottle, which was placed in hot water. Within 1½ minutes the animal fell and remained motionless for 18 minutes, during which time the growth was excised and a hot iron applied to the wound.¹⁷

William Guybon Atherstone

Whilst ether anaesthesia was becoming established at the Cape, a medical practitioner in Grahamstown, Dr. William Guybon Atherstone (Fig. 2) reported his success with ether in abolishing pain during an amputation. This report appeared in the *Graham's Town Journal* on 19 June 1847, and in an article by Dr. Atherstone in the same newspaper dated 26 June 1847. For some time he had experimented with ether in different types of apparatus with and without valves. He eventually decided to use a 2-quart bottle containing 2 oz. of ether stopped with a cork through which 2 holes had been bored (Fig. 3). Through one aperture he pushed a glass tube ½ inch in diameter until the one end reached a position ½ inch from the ether surface. In the other hole an elastic tube with an ivory mouthpiece was fixed for the inhalation of the ether vapour. Both tubes were then blocked for some minutes to allow the air in the bottle to become saturated with ether vapour. After this the apparatus was ready for use.

Dr. Atherstone emphasized that the success of producing anaesthesia depended on the rapidity of induction. He contended that rapid evaporation of the ether should be aimed at by increasing the surface area of ether rather than applying heat. For this

reason, and also that the vessel might contain sufficient ether vapour, he used a large bottle. He found that if the ether bottle were placed in hot water—a method which he had seen recommended in English papers—the patient was unable to inhale the vapour. It produced a burning sensation in the chest and caused the patient to cough.¹⁸

He further recommended that the elastic tube should have a large enough diameter to diminish the resistance to inspiration, the respiration should be slow and deep and the breath should be held at the height of inspiration for a few seconds before the gas was exhaled.

The operation was performed on Mr. F. Carlisle, the Deputy Sheriff of Albany, who had suffered from a contracture of the leg for 27 years. In the course of time an ulcer had formed. He would have had the limb removed years ago had it not been for the pain associated with such an operation. After he had inhaled ether vapour and had satisfied himself that it could deaden pain, he consented to the operation under the condition that he would give the signal when the surgeon could begin. So on Wednesday 16 June 1847 everything was set for the amputation. After the



Fig. 3. Atherstone's ether apparatus.

patient had inhaled the ether vapour for a short while, he pinched himself repeatedly to ascertain the degree of insensibility. Eventually he gave the word that the operation could commence. Dr. W. G. Atherstone, assisted by his father and two other medical practitioners, amputated the thigh through the lower third. As the nerves and vessels were cut the patient gave an involuntary scream. When the leg was off the ether bottle was taken from the patient and he started recovering. The whole procedure had taken about 3 minutes.

When he had come to his senses Mr. Carlisle said: '... it's the greatest boon ever conferred on man, I have been totally unconscious of everything—the sound of that horrid saw still grates upon my ear as if heard in a dream from which you have just awoke me, but as for pain I have not felt the slightest.'¹⁹ (He recollected later that he had a dream of attending an amputation on another person.) The patient did well after the operation, except for a period of delirium tremens attributed to the sudden cessation of opium applications, which he had been putting on the ulcer for years. This episode was checked by the administration of a laudanum enema.

It is of interest to record Dr. Atherstone's observations during the operation and his view on the mechanism of producing muscular relaxation. When he had cut the arteries and veins he noticed that the blood issuing from both was dark. He realized that this was due to sub-oxygenation and voiced a warning against carrying on the ether inhalation for a long time. He pointed out that, where previously several assistants had been necessary to overcome the muscular resistance in reducing dislocations and fractures, now ether could be employed to provide adequate muscular relaxation,¹⁸ but erroneously attributed the relaxation more to the partial asphyxia than to the ether itself.

To ensure that all the medical practitioners would benefit by the new discovery and because there was no medical journal in the

Eastern Province he sent a detailed description of the procedure to the newspapers.

Chloroform

Towards the middle of 1848 the news of a new liquid which had the same effect as ether reached South Africa and in August of the same year this latest medicine, perchloride of formyle, or chloroform, was being advertised to have arrived in Grahamstown.²⁰

On 26 May 1849 the *Graham's Town Journal* reported on an operation which Dr. W. G. Atherstone had performed a fortnight previously on a young man, John Swan, who at the time had been anaesthetized with chloroform. After the operation, which was for the excision of a wen in the front of the neck, the patient declared that he had not felt the slightest pain and the only event of the operation he could recall was that of a confused uneasy dream.

In Cape Town the first public announcement of the successful use of chloroform locally appeared about a year later,²¹ after Dr. Biccard had administered the anaesthetic for the fourth time. On this occasion he gave it to a woman for the removal of a tumour in each breast to prevent cancer. 'She inhaled for a few minutes Chloroform to about the quantity of a dram and a half. Upon her being overcome by its effects the operation was commenced and finished *without her feeling any pain*.' The article ended by saying it hoped to serve the country inhabitants, who were unable to acquaint themselves with the increasing methods for alleviating human suffering and were pining under diseases which could only be removed by surgical skill, and that they 'will find something in this short statement to cheer their spirits, and enable them to meet the dreaded hour of the surgeon's call with a composure to which they would have been strangers.'²²

Thus the first great stumbling-block in the advancement of surgery had been overcome, but another big problem still had to be solved. This problem was that of sepsis, which was responsible for an extremely high mortality and morbidity rate amongst patients treated surgically.

Carbolic

At a time when the world was acclaiming the success of ether anaesthesia the Hungarian Semmelweis published his treatise on sepsis in 1847. In dealing with puerperal mortality he was convinced that direct contact of undisinfected hands and material was the cause of sepsis in the uterus. By disinfecting the hands in chloride of lime he reduced the puerperal mortality from 9.9 to 1.3%. Although he had a few followers his work was not recognized by the majority. Twenty years later, Lister presented his antiseptic technique in the treatment of compound fractures. For many years he too had to fight for the acknowledgement of his theories against the opposition of his professional brethren.²³

One of his first followers in South Africa was Dr. J. P. Fitzgerald of King William's Town. The Colonial Government had drawn his attention to Lister's ideas and methods. In a letter dated 6 March 1869 addressed to the Colonial Secretary at Cape Town, he writes on his experience of using carbolic acid in the treatment of extensive lacerated wounds and mentions that he had used it as a dressing after amputations. He was most impressed by the sudden cessation of pain after the application of carbolic acid on several contused and lacerated wounds and by the freedom from local and constitutional disturbances resulting in the rapid recovery of his patients.²⁴ This is the first reference to any form of local anaesthesia in South Africa by the application of drugs. To this day phenol has its place as a local anaesthetic for topical application and as a powerful disinfectant. However, mortality following surgery remained relatively high until Semmelweis' teachings of asepsis were brought to light again by Schimmelbusch under the guidance of von Bergmann. Thus the present era of aseptic surgical technique was born in 1885.²⁵

Chloral

In the mid-1870s Dr. J. F. Allen of Pietermaritzburg experimented with chloral as an anaesthetic for children. After the administration of 45-60 grains the state of unconsciousness persisted for 3-4 hours. He found that this type of anaesthetic was not attended with success in adults.²⁵

Chloroform and Ether

When operations were performed, and in those days they were few and far between, chloroform was the anaesthetic chosen in

the majority of cases.²⁶ In obstetrical practice, however, chloroform was only employed in isolated instances, and craniotomy was preferred to Caesarean section;²⁷ one presumes that the former was performed without anaesthesia.

Where general practitioners were separated from one another by hundreds of miles, they were obliged to operate single-handed. The doctor was both anaesthetist and surgeon. After inducing anaesthesia himself, he handed over the administration of the anaesthetic for its maintenance to the local village constable or the chemist, to the teacher or the patient's wife, to the dentist, or even to his own 'Cape boy' cart driver, whilst he himself carried out the operation and also kept a watchful eye on the general condition of the patient as well as on that of his lay helper; the watchword being, as expressed by James Syme's aphorism, 'attend to the respirations, never mind the pulse'.

Deaths under Anaesthesia

The practitioners rarely administered ether alone; usually it was in combination with chloroform or with chloroform and alcohol—the A.C.E. mixture, which contained the agents in various proportions to individual liking. The main reasons given for the uncommon use of ether were its pungent property and the lack of teaching in anaesthesia. Chloroform was more easily administered and the induction was more pleasant to the patient. In 1907 only 8 out of 22 medical examining bodies in Great Britain required students to show evidence of instruction in anaesthesia, but in 1911 the General Medical Council of Great Britain stated that all medical examining bodies required their candidates to show proof of knowledge and training in anaesthesia.²⁸ The majority of students considered it a necessary evil to study anaesthesia to comply with the regulations, and after qualification the young doctors showed very little interest in the administration of anaesthetics, which was chiefly by the 'rag and bottle' method.

However, the increase in the deaths with chloroform administrations, often occurring during the induction period, became a matter of great concern amongst the medical profession. In South Africa the death of a person whilst under the influence of a general anaesthetic was subject to investigations by the Resident Magistrate or Field Cornet because of the interpretation of the Inquest Act of 1875, and later of 1919. Before this, the holding of an enquiry in cases of a sudden death had become necessary by custom in the Cape Colony;²⁹ it became a written law with the promulgation of the Act. To-day the same regulations are valid by virtue of section 86 of the Medical Dental and Pharmacy Act, 1928.

It was soon recognized by many that chloroform was not suitable for patients sitting in the dental chair and that the proportion of deaths during anaesthesia was higher at Johannesburg than at sea level. By far the majority of fatalities at Johannesburg took place when the patients were under the influence of chloroform.³⁰ In the last decade of the nineteenth century and in the beginning of the twentieth medical men in South Africa voiced the opinion that ether was safer than the generally used chloroform, and so ether became more frequently employed. One of the advocates of a change in this direction was Dr. George Warwick Bampfylde Daniell, the first specialist anaesthetist in South Africa.

THE MODERN DEVELOPMENT OF ANAESTHESIA IN SOUTH AFRICA

George Warwick Bampfylde Daniell

Dr. Daniell qualified in 1888 M.R.C.S. (Eng.) L.R.C.P. (Lond.). The following year he came to the Cape and set up as a general practitioner in Caledon, where he remained until 1897. After the Boer War, in which he acted as a Civil Surgeon, he left for England to devote his time to anaesthesia, and was appointed as an anaesthetist to various hospitals in Great Britain and as a lecturer in anaesthesia to medical students. In January 1906 he returned to South Africa and began to practice in Cape Town, confining himself entirely to his speciality. A year later he moved to Johannesburg, where he had been appointed as a specialist anaesthetist to the Johannesburg General Hospital. After his resignation in 1908 he was succeeded by Dr. Frank Burnand Mudd. In 1921 Dr. Daniell and Dr. Mudd accepted the lectureship in anaesthesia at the Cape Town and Johannesburg medical schools respectively. Ten years after his retirement Dr. Daniell died in Port Elizabeth on 16 January 1937. In his time he was regarded as the highest South African authority in anaesthesia. He designed and modified various appliances, some of which were in use as recently as 10

years ago. He contributed many articles towards the medical literature.

Ethyl Chloride

Whilst he was in England he invented the Daniell ethyl-chloride inhaler (Fig. 4) which was then considered the best of its kind. It allowed for the gradual administration of ethyl chloride, whereas beforehand ampoules had been crushed and the liquid poured on to a mask, allowing but poor control of vapour concentration. The inhaler came into use in South Africa in 1904. Before this time ethyl chloride had seldom, if at all, been employed in this country. In a letter which appeared in September 1904 in the

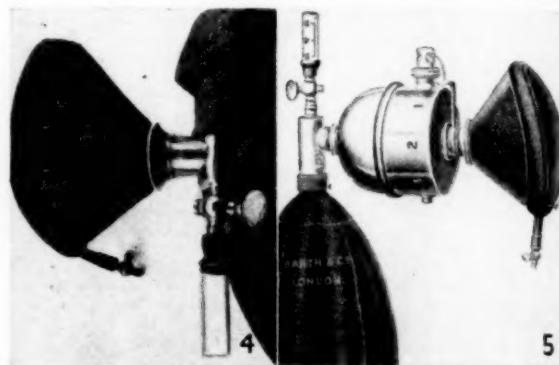


Fig. 4. The Daniell ethyl-chloride inhaler.

Fig. 5. The Clover ether inhaler.

South African Medical Record, Dr. C. J. Hill Aitken from East London wrote that ethyl chloride was as safe as gas and much handier, because the inhaler and the glass cylinder could be carried in a small handbag. 'Without doubt it will be a boon to the Profession and to the public.' At first ethyl chloride was used continuously throughout operations, but this technique was soon abandoned and its primary function became that of an inducing agent and ether was administered for maintenance.

Nitrous Oxide

The gas referred to in the above letter is nitrous oxide. As the continuous-flow method of administration, which required large quantities of the gas, was the only one known at the time, practitioners, for economic reasons, used it sparingly. They mainly gave it as an inducing agent, for short operations and in dentistry. The preparation of the gas involved high costs and it had to be shipped from England to South Africa. For refilling, the cylinders were sent back, where they were tested by the English Board of Trade and sometimes discarded without compensation. When the compressed gases were returned they could only be transported at special rates and on special ships as deck cargo. It took at least 3 months before the cylinders reached their owners again. During the 1914-18 war the shipment of the cylinders was prohibited; after the war until the early 1930s the administration of the gas remained uncommon here except for bad-risk and special (e.g. diathermy) cases.³¹ It was only in 1928 that the firm Allen Liver-side Industrial Gas (S.A. 1927) (Pty.) Ltd., Johannesburg, later known as African Oxygen and Acetylene (Pty.) Ltd., manufactured nitrous oxide in Johannesburg on a commercial scale. The plant they installed was capable of producing several times the then known requirements of the Union, Rhodesias and adjacent territories.³² The development of the re-breathing and carbon-dioxide absorption techniques and the local preparation of nitrous oxide brought down the cost of this anaesthetic to a reasonable level, and the surgeons, at the request of their patients, gradually increased their demand for nitrous oxide and oxygen anaesthesia.

Oxygen

Shortly after Dr. Daniell started his anaesthetic practice in South Africa he gave demonstrations of nitrous oxide and oxygen anaesthesia throughout an operation,³³ but its use remained confined to isolated cases for a considerable time. When he

moved to Johannesburg he found that neither nitrous oxide nor oxygen was available at the General Hospital.³¹ It was not the practice to administer oxygen in association with anaesthetic agents. The original idea of adding oxygen to an anaesthetic was to diminish the respirations, but Dr. Daniell emphasized the safety and comfort it contributed in anaesthesia. However, in 1908 oxygen was not easily obtainable and the transport of the cumbersome cylinders with oxygen and nitrous oxide further limited their use, especially in country districts.

To overcome this disadvantage a portable apparatus called 'Oxone' generator was advertised and probably used to obtain oxygen. 'Oxone', a compact preparation of hydrogen peroxide, produced oxygen when brought into contact with water and it was alleged to be generated at the exact speed required for the inhalation in a man's lung.

In 1908 the New Transvaal Chemical Co. Ltd. manufactured oxygen on a commercial basis and in 1915 Lever Bros. (S.A.) (Pty.) Ltd. took a controlling interest in this Company. The goodwill, plant and stock of Lever Bros.' oxygen business at Denver and at Congella, Durban, were disposed of to the Allen Liversidge Company 12 years later.³⁵

Although oxygen was being manufactured in this country, its price remained high for many years, which of course did not encourage its use. During the First World War a shortage of oxygen cylinders caused an irregular supply, and even for some years later these cylinders continued to be a novelty.³⁶

Ethylene was not used in South Africa to any extent, the only record I could trace in this respect was in connection with experiments made by Dr. T. Greenwood Hall in 1921. He had saturated ether with ethylene and carbon dioxide and used this agent as an anaesthetic in surgical and dental operations. At about the same time a description of this anaesthetic, called 'Ethanosal', appeared in a résumé of a paper by Drs. Wallis and Hewer in the British Medical Journal.³⁷

The commonest method of administering anaesthetics was the open one by means of the wire-framed mask covered with lint or wide-meshed gauze, but the practitioners did employ others as well, such as the Clover inhaler with its modifications (Fig. 5), the Shipway apparatus, or rectal and local anaesthesia.

Endotracheal Ether-Oxygen. For operations around the head and neck and where the practitioner had to work single-handed, rectal anaesthesia was advised. It was given either by introducing warmed ether vapour or a warmed mixture of ether and olive oil into the rectum. In 1915 Shipway's endotracheal ether-oxygen apparatus came into use. It was recommended for head, chest and upper abdominal operations and for applying artificial respiration.³⁸ After the patient had been anaesthetized a catheter of such a size as to allow the expiratory gases to pass easily between the catheter and the laryngeal wall was introduced either down the larynx or through the laryngotomy or tracheotomy opening which had been made beforehand. By means of a hand bellows—in later years by a foot bellows or by an electric motor working a rotary blower—air alone or with oxygen could be pumped through the ether container. The ether vapour was then led through a coil immersed in a hot-water receptacle (Fig. 6), and from there the warmed ether vapour reached the patient either through the endotracheal catheter or via a mask made of porous material or

of perforated celluloid in which the holes had been partially occluded with a sponge or a piece of flannel. Dr. Daniell modified this apparatus by passing the air and oxygen first through a coil immersed in hot water and subsequently through the ether. From the ether container the vapour reached the patient via the warmed coil as already described (Figs. 7 and 8). When the patient's own respiratory movements had been abolished the pumping mechanism maintained adequate ventilation. Thus, this method of controlling respiration has been known for over 40 years.* It probably, however, operated largely through diffusion respiration.

As practitioners realized the safety of ether as an anaesthetic agent its use increased and by 1921 Shipway's warmed-ether apparatus had become so popular that it was used extensively by private practitioners and in hospitals throughout South Africa.⁴⁰ It enjoyed that position for a quarter of a century.

Ether was first produced in South Africa on a commercial scale in January 1918 by the firm The Natal Cane By-Products, Ltd., which had been established 3 years previously. Anaesthetic ether was imported from overseas before this, and still is to some extent.⁴¹

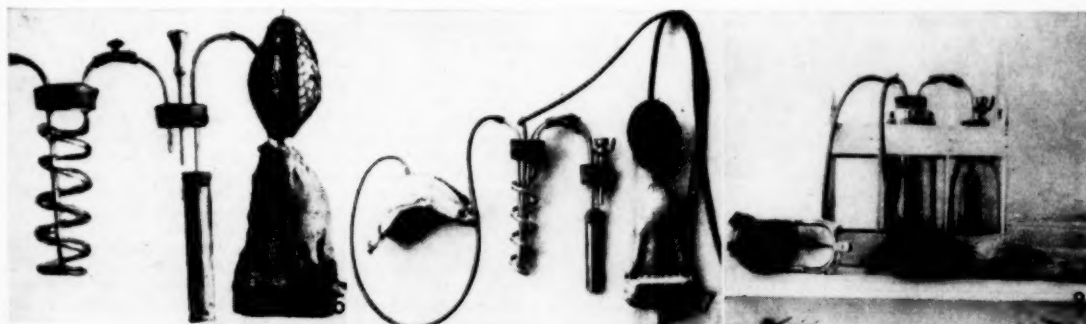
Local anaesthesia was not frequently employed by practitioners in South Africa. Its regular use was mainly confined to the ophthalmologists and the dentists. At first only those trained on the Continent practised regional anaesthesia.

Lumbar Anaesthesia. At the South African Medical Congress held in Pretoria in 1907, Dr. E. F. A. Sthamer read a paper on Lumbar Anaesthesia and its practical application in surgery, in which he gave a description of the method and some of his experiences with this type of anaesthesia.⁴² However, the difficulty in mastering the technique of spinal, caudal, epidural, and nerve-block infiltrations and the time necessary to perform them hindered their extensive use.

Pre-operative Care. Another important development which took place in the first 2 decades of this century was the more adequate preparation of the patient for an anaesthetic. Whereas anaesthetists hardly ever examined their patients systematically beforehand and, if they did, then it was only where there was a suspicion of heart or pulmonary disease, it now started to become a routine. It was urged that blood-pressure readings should be included to determine the state of the cardio-vascular system pre-operatively, and that urinary examinations would reveal important information.

Premedication. Practitioners began to realize the benefit of the administration of drugs before the operation, not only as an adjuvant to the anaesthetic and a counter-balance to its side-effects, but also to allay the fear in the patient's mind and to ensure a good night's rest. Atropine had been injected pre-operatively on some occasions, chiefly to counteract the inhibitory effect of the vagus on the heart; its use became more frequent to minimize salivary excretion with the increase in ether anaesthesia. By some hyoscine was favoured because of its additional depressant

* The first apparatus for maintaining prolonged periods of artificial respiration was demonstrated by Dr. W. Stewart in Johannesburg in 1918. It was made for the treatment of children suffering from respiratory failure in an epidemic of anterior poliomyelitis. As, however, the apparatus was only completed after the last patient had died he called for suggestions which would render it more efficient should it come into operation. Whereupon it was proposed that a dog should be fully curarized to act as a test.³⁹



Figs. 6, 7 and 8. Daniell's modification of Shipway's endotracheal ether-oxygen apparatus.

effect. The addition of morphine to the premedication also put the patient in a calm state of mind, and reduced the amount of anaesthetic required during the operation. At first an objection to this use of morphine was that it affected the size of the pupil and thus interfered with an important sign of the depth of anaesthesia, but practitioners soon learnt to put more reliance on the type, regularity and amplitude of the respirations and on pulse and blood-pressure readings. Authorities advised not to give too large a dose of morphine, because this delayed the return of reflexes and of consciousness, and to be wary in giving it to patients with increased intracranial pressure and advanced respiratory diseases. At times patients received chlorbutol (Chloretone), potassium bromide or barbitonum (Veronal) as substitutes for morphine in the premedication.

On some occasions the morphine-scopolamine combination in repeated doses constituted the sole anaesthetic, which if necessary could be supplemented by ether inhalations. This combination also found its use in obstetrics to produce 'twilight sleep', but the danger of respiratory depression in the newborn was repeatedly emphasized.

In the conduction of anaesthesia Dr. Daniell stressed the importance of a clear airway, adequate oxygenation, and free chest expansion. Apparently the anaesthetists of that time had difficulty in dealing with their female patients, who were reluctant to loosen their corsets sufficiently. An American gynaecologist estimated that they produced an all-round pressure of 30 lb.

Intravenous Anaesthetics. A new era in the administration of anaesthetics commenced in this country with the introduction of hexobarbitonum solubile (Evipan sodium) in 1933.⁴³ It provided a rapid and pleasant induction, thus avoiding the feeling of suffocation produced by the mask. It is true that basal narcotics such as the rectal administration of bromethol (Avertin) since 1930⁴⁴ and the intravenous injections of butyl- β -bromallyl barbitone sodium (Pernoclon sodium) and of pentobarbitone sodium (Nembutal) had been employed, but it was Evipan sodium which popularized the use of intravenous anaesthesia. The drug now most commonly used for this purpose is thiopentone sodium (Pentothal sodium), which Dr. C. W. H. van der Post, of Durban, administered for the first time in South Africa in 1936.^{45,46} Although a 10% solution of the drug was injected originally, experience taught that a lower concentration provided a more accurate dosage, which contributed to greater safety, and also made perivascular reactions less likely to occur if some of the solution were inadvertently deposited in the tissues.

New Inhalation Anaesthetics. Two years previously a new inhalational anaesthetic, cyclopropane, had been brought out to South Africa by Dr. Royden M. Muir.⁴⁷ During his visit to the United States of America in 1933 Dr. Waters of Madison coached him in its use. Encouraged by what he had seen in America, and after some experience, he took 2 cylinders filled with cyclopropane back to England and gave the first administration with it in London.⁴⁸ On his return to South Africa he started giving it in Cape Town. Its use, however, remained limited mainly owing to the high cost of the gas.

After the Second World War many developments took place in the field of anaesthesia. In 1946 another new inhalational anaesthetic, trichloroethylene (Trilene), made its appearance in South Africa.⁴⁹ It was to replace the chloroform in using the Boyle's apparatus. This machine gained in popularity and gradually replaced other appliances to a large extent. Its use, or that of an apparatus resembling it in construction, became imperative with the advent of curarimimetic drugs as a means of assisting or controlling the respirations by intermittent positive pressure.

Relaxant Drugs. Whereas good relaxation could previously only be achieved with local or deep general anaesthesia, intravenous injections of d-tubocurarine chloride now gave the same effect with light general anaesthesia. South African anaesthetists gained some experience of d-tubocurarine chloride at the various theatres of war, but its more general use in this country, as Intocostrin, dates from 1946.⁵⁰

After this, various other relaxant drugs were tried out—gallamine triethiodide (Flaxedil)⁵¹ and decamethonium iodide (Eulissin)⁵² in 1949, succinyl chloride (Lysthenon, Scoline)⁵³ in 1952, and laudexium methosulphate (Laudolissen)⁵⁴ in 1953. Furthermore, in recent years hypotension and hypothermia, have been developed as adjuvants to general anaesthesia, which in selected instances have been a valuable aid in various operations.

THE STATUS OF ANAESTHESIA IN SOUTH AFRICA

By force of circumstances a general practitioner of the early days often had to call in the help of laymen to give anaesthetics. Only 30 years ago the following statement was made: 'Any practitioner can legally employ anyone whomsoever as an anaesthetist, he shouldering the whole responsibility'.⁵⁵ Such action, however, was condemned except in special instances, but it was doubted if any Medical Council (until 1927 every Province of the Union had its own Medical Council) would regard it as a ground for disciplinary action.

In 1927 the Federal Council of the Medical Association of South Africa passed rules for professional conduct which *inter alia* set out that it was detrimental to the honour and interests of the medical profession to employ an unregistered person as a paid anaesthetist at an operation.⁵⁶ Nine years later the South African Medical and Dental Council put the matter quite clearly by resolving 'that the administration of anaesthetics was an act pertaining to the calling of a medical practitioner'.⁵⁷ Dental practitioners, however, had been administering anaesthetics since the early days and according to a notice sent to them in April 1938 were permitted to give nitrous-oxide anaesthesia. This apparent restriction was done away with in 1944 by a resolution passed by the South African Medical and Dental Council, which read: 'The Council further resolved that in the practice of dentistry, the administration of anaesthetics by dentists should be unlimited'⁵⁸ and some provisos were added.

When the registration of specialties was introduced in 1938 to protect the public and medical practitioners from the pseudo-specialists, anaesthesia was listed among the specialties of medicine.⁵⁹ The regulations governing specialization since that time have been revised from time to time. After the Second World War a medical practitioner had to be in the possession of a higher qualification in Anaesthesia in addition to other requirements, before he could register as a specialist anaesthetist. The Witwatersrand Medical School, Johannesburg, was the first to provide facilities for such a higher degree to be taken in South Africa, instituting the Diploma in Anaesthesia⁶⁰ in 1947. In later years the University of Pretoria and the University of Cape Town also made it possible for medical practitioners to obtain a higher qualification in Anaesthesia.

During the last war, on 1 August 1943, the South African Society of Anaesthetists was founded in Johannesburg. This organization is a Group of the Medical Association of South Africa and has as its main aims (a) the promotion of the science of anaesthesia; (b) the correlation of the interests of all practising anaesthetists in South Africa and the determining of the relationships which should exist between anaesthetists, and between anaesthetists and hospitals (public and private), Government authorities, the general public and the medical profession in general; and (c) to represent and further the interests of anaesthetists.⁶¹

At the instigation of this society a separate Section of Anaesthesia was formed for the first time at the 34th (1st post-war) South African Medical Congress, which was held in Durban in October 1946. At the end of the opening plenary session on the 'Conquest of Pain' the Congress passed a unanimous resolution stressing the desirability of founding Chairs in Anaesthesia at the South African medical schools.⁶² The University authorities did not consider the time ripe for this action. In 1947 none of the medical schools had well organized departments of anaesthesia, but since that time the position has greatly improved by the appointment of full-time teaching staffs.

Nevertheless, the recommendations made by the Commission of Inquiry into Anaesthetic Deaths, appointed by the Government in January, 1936,⁶³ have only been partly observed, for it is possible that an intern at certain institutions may go out into general practice without having given a single anaesthetic during his internship year. This has been criticized for the reason that the theoretical as well as the practical teaching of anaesthesia is of great importance in the training of students and interns, if skilled medical practitioners are to be provided throughout South Africa for the safe administration of anaesthetics.

In the past a comparison has been drawn between intravenous anaesthesia and the Libyan Desert, which Rommel is reputed to have described as a tactician's paradise and a fool's graveyard. To-day this analogy could well be applied to every sphere of anaesthesia. If the present-day anaesthetist is to fulfill the demands required of him for the benefit of his patients and to facilitate the

work of the surgeon, he must possess a good knowledge both of his own specialty and of the basic and clinical sciences of medicine.

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SODIUM AND POTASSIUM BALANCE*

(1) IN RELATION TO PERIODIC PARALYSIS AND (2) IN A CASE OF PYELONEPHRITIS WITH MALIGNANT HYPERTENSION

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Reversible temporary muscular paralysis including periodic paralysis has frequently been reported in association with disturbances of potassium metabolism. It is clear that paralysis may occur with a low, a normal or a raised serum-potassium concentration and in any individual attack the following possibilities arise:

- Hypokalaemia**
 - Diminished intake + excessive gastro-intestinal loss of potassium.
 - Potassium-losing renal diseases.
 - Primary aldosteronism.
 - Classical familial periodic paralysis.
 - Sporadic periodic paralysis.
 - Periodic paralysis with associated thyrotoxicosis.
 - Miscellaneous: Diabetic acidosis during treatment, alkalosis, P.A.S. intoxication etc.
- Normokalaemia**
 - Salt Lake City type of familial periodic paralysis.
- Hyperkalaemia**
 - Scandinavian type of familial periodic paralysis (adynamia episodica hereditaria).
 - Chronic renal disease.

- Serum-potassium level unknown (? hypokalaemia).
 - Pa Ping or Kiating paralysis (? barium poisoning).

We wish to report (1) a study of a case of sporadic periodic paralysis, and (2) a case of pyelonephritis and superimposed malignant hypertension, with hypokalaemia, but without paralysis, in which there was renal sodium wastage and an increased aldosterone excretion in the urine.

CASE OF PERIODIC PARALYSIS

Generally speaking information on balances in periodic paralysis is meagre, and scant attention had been paid to the state of sodium metabolism in this disorder, until Conn suggested that there was an intracellular sequestration of sodium prior to the attack and a natriuresis succeeding the attack and that the disease should be treated with a low-salt regime after preliminary de-salting.

The subject of the present study was C., a 17-year-old White male from Knysna district, who had had periodic attacks of paralysis 2-3 times a week since the age of 6 years. There was no family history of similar attacks, but his father is said to have suffered from epilepsy. The attacks varied in duration from a few minutes to several hours and they were most frequently nocturnal in onset; exertion on the preceding day appeared to be a precipitating factor in some instances. Their character varied from mild aching in muscles with slight loss of motor power to complete paralysis from the neck down, although cranial nerves and diaphragm were never involved. Consciousness, the special senses and sensation

* Abstract of paper read at a meeting of Research Forum, University of Cape Town, held at Groote Schuur Hospital, Cape Town, on 5 February 1958.

were not involved, although the acts of micturition and defaecation were in abeyance during the severe attacks.

Observation in hospital confirmed that the attacks varied from a subclinical form, in which loss of motor power of the extensors of the leg and abductors of the shoulder was detectable on objective testing, to profound paralysis with inability to turn in bed. Generally muscles were painful and the face appeared puffy. The attacks were both spontaneous and could be induced by a large carbohydrate meal, by glucose loading, and by insulin administration. In the attacks the serum-potassium concentration fell precipitously; in one of the induced attacks it was noted that the serum-sodium concentration had also fallen slightly. With the attacks both urinary sodium and potassium excretion diminished. The expected electrocardiograph changes of hypokalaemia were repeatedly observed. The cerebrospinal-fluid potassium concentration also fell, while the cerebrospinal-fluid pressure was considerably elevated. Biopsy of the vastus muscles showed a pronounced vacuolar change, and muscle analysis on the 30th day of a low-sodium diet showed the intracellular sodium concentration to be raised and the potassium concentration, if anything, reduced, although a higher figure was obtained during an attack.

In an attempt to test Conn's suggestion that a period of desalting and low-salt intake might alleviate the condition, the patient was placed on a diet containing approximately 26 mEq. of sodium and 110 mEq. of potassium. A period of high intake (208 mEq. of sodium) followed before reverting to the initial low-sodium intake.

The results were illustrated graphically and are divisible into 3 phases:

(a) Low Sodium Intake: During the initial period of observation (56 days) attacks could be induced with both glucose and insulin. On the 41st day the administration of 1,000 mg. of chlorothiazide resulted in the loss of 270 mEq. of sodium. Thereafter no overt attacks of paralysis occurred—nor could they be induced by glucose and insulin loading, or the administration of tolbutamide or of 1.0 mg. of 9 α fluorohydrocortisone.

(b) High Sodium Intake: During the second phase (59 days) of salt loading the attacks recurred, including both spontaneous and induced attacks—9 α fluorohydrocortisone induced an attack, and an extremely severe attack lasting 48 hours followed a water-load test. Chlorothiazide did not abolish the attacks.

(c) Low Sodium Intake: During the final low-salt period (26 days) attacks occurred with greater frequency although on the whole with lesser intensity. Chlorothiazide therapy did not prevent the repetition of attacks. Supplementation with KCl was necessary.

On supplementary KCl plus moderate sodium restriction and chlorothiazide once a week he had remained in relatively good health with approximately one mild attack per week.

In general there appeared to be considerable sodium retention before the attack with subsequent release of the retained sodium, although such retention did occur without the development of an attack. A diet of 26 mEq. of sodium with added chlorothiazide appeared to be beneficial at first but after salt loading this diet plus chlorothiazide failed to abolish attacks.

Urinary excretion of potassium during the same period showed

an irregular behaviour and until dietary intake and faecal potassium are plotted judgment must be reserved.

Aldosterone figures are not yet to hand and further studies are planned in the near future, in particular the effect of a high-protein diet.

CASE OF RENAL DISEASE AND ALDOSTERONISM WITHOUT PARALYSIS

The second patient reported illustrated the difficulty of differentiating primary aldosteronism with secondary renal disease from a primary renal disease with sodium and potassium wastage and secondary aldosteronism.

P. was a 47-year-old Coloured female who presented with a 2-months history of severe headache and failing vision, frequency and dysuria. Six years before, a single blood-pressure reading during an admission for pelvic peritonitis was recorded as 170/110 mm. Hg. She was a sick-looking female with an old left Bell's palsy and slight facial hirsuties. Bodily configuration was normal. There was no oedema.

The blood pressure was 300/160 and the heart showed marked left ventricular enlargement. Examination of the fundi revealed numerous exudates, haemorrhages and marked papilloedema. The urine was usually slightly acid in reaction. Specific gravity on 12 hours fluid deprivation was 1012. Proteinuria was constant and a gross pyuria was present. Coliform organisms were cultured from the urine.

17-Ketosteroid and 17-ketogenic steroid excretion was within normal limits but 3 aldosterone estimations varied between 20 and 30 μ g. per 24 hours. There was evidence of renal wastage of potassium.

The initial serum potassium was 2.7 mEq./l. but there was no alkalosis.

Balance data confirmed the renal wastage of potassium with phases of marked sodium loss also in the urine and the easy correction of the hypokalaemia by potassium loading. Possible explanations of the balance data were discussed.

Complete right and partial left adrenalectomy was performed, and revealed nodular hyperplasia of both adrenal glands. Renal biopsy showed evidence of bilateral pyelonephritis with superimposed changes of malignant nephrosclerosis. The post-operative course was stormy, with the development of uraemic pericarditis. The patient appeared to be improving, when she died suddenly, the cause of death being a pontine haemorrhage. The remainder of the left adrenal gland also showed nodular hyperplasia.

It has been stated that exploration of the adrenal glands is necessary before the diagnosis of primary aldosteronism can be excluded; but the implication that primary aldosteronism can be excluded in this way is fallacious, for after operation and autopsy, and even with evidence of adrenal hyperplasia and a raised urinary aldosterone, we are still unable to state whether this alteration in the adrenal glands is primary, or secondary to pyelonephritis with wastage of sodium. The latter on balance of evidence appears more likely.

It is claimed that paralysis need not be present in primary aldosteronism. The absence of paralysis in this case, with hypokalaemia, is readily attributable to the fact that serum potassium was only moderately reduced. In addition, prolonged renal sodium wastage with a depleted intracellular sodium content may have contributed.

INDUSTRIAL INJURY: THE PRACTICAL NEED FOR EVALUATION OF CAPABILITY*

Abstract of Article by

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In any discussion of rehabilitation, one must adhere to the premise that there is no substitute for earning capacity. It therefore becomes the moral responsibility for all who deal with the injured individual to protect and increase his earning capacity. A financial

settlement cannot adequately protect him. The false sense of security of x dollars for y number of weeks will not protect him. The greatest protection of his security lies within his own capabilities and in his own ability to exploit himself.

Once a man has suffered a disability he forfeits his position in the world he knows as it moves on ahead of him. How far he lags behind will depend upon the severity of the injury, his psychological make-up, and what tow-ropes are available to

*From *Journal of the American Medical Association* (1957): 165, 934. Published at the request of the Workmen's Compensation Commissioner, Pretoria.

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which he can cling so as not to be left so far behind that he cannot catch up.

We have highly specialized centres for the severely disabled and many sources for treatment of minor injuries, but comparatively few sources for complete physical treatment designed for people with moderately severe injuries who anticipate returning to their previous occupations or some modification of their normal employment. It must be emphasized that for every severely injured patient requiring total rehabilitation there are at least 50 requiring extensive and intensive medical rehabilitation. These are frequently forgotten men. They are the ones who often suffer great loss and unnecessary permanent disability.

While medical rehabilitation includes the utilization of all branches of medicine, it should be understood that the references in this paper to treatment will be confined to restoration by utilization of conservative physical means. Actually, this communication is a presentation of the theoretical consideration: Should a practical realistic rehabilitation programme be established which will return the injured person to his former occupation or, failing in this objective, prove he is incapable of performing his former occupation?

In many instances it becomes the responsibility of a physician to determine whether the injured is employable. It is common for the physician to state that the patient can return to work while the patient insists that he is incapable of fulfilling the job requirements. It must be recognized that there are numerous extraneous factors which influence these opinions. In many instances these factors are intangible and stem from psychological influences. Some of the psychic influences on the patient are feelings of insecurity, fear of discharge for non-performance, fear of a second similar kind of injury, and depression from prolonged inertia and defeatism. Only too frequently the physician's statement of work ability is as subjective as the patient's complaints.

It must be recognized in evaluation that an individual with a given disability may be able to perform under certain working conditions and fail completely in a different working situation. Consequently it is common experience for him, upon being returned to work, to find himself actually incapable of performing an average day's work.

Unless the physician is aware of the total requirements of the work situation and is fully cognizant of the capabilities of the injured person as applied to that particular work situation, it becomes impossible for him properly to evaluate employability. Therefore in determining when an individual should return to work the physician must estimate and evaluate the following points: (1) The individual's subjective complaints, (2) the degree of disability, (3) the nature of the injury, (4) the requirements of the job, and (5) the individual's true working capacity.

From the point of view of the injured person, light work is any job which he can perform within the limitations of his abilities, and which is not as physically demanding as his normal occupation. Therefore, by nature of this definition, light work will vary according to the type of injury. For example, with a leg injury, light work would consist of any type of activity of the upper extremities, with various restrictions of weight bearing. Another example of light work would be, with an upper-extremity injury, work activity requiring the use of the opposite uninjured upper extremity or possibly limited activity of the injured extremity. With a back injury it may mean work modifying or restricting the amount of stooping or lifting involved.

It is obvious that each situation will have to be considered on its own merit. If the employer is a large concern that can provide work with a variation in physical demands, the injured person frequently can be readily fitted into the organization.

A small organization may find it more difficult to find suitable activities.

There is only one fundamental question involved in considering the need for rehabilitation: Will the treatment be of benefit to the injured? But the determination of both the extent and the quality of the treatment is usually based upon the recommendation of a physician, just as it is frequently the physician's responsibility to determine employability. With few exceptions the recommendation for specialized treatment must come from a physician, who is not in a position to provide that treatment himself.

The main reasons why the injured person fails on attempting to return to work are as follows:

1. There is no such thing as modified or light work unless the employer desires it.
2. There has been improper general reconditioning, especially where there has been prolonged disability. It is a fact that when an injured man has been off work longer than a few weeks he becomes deconditioned. He must be reconditioned to become capable of performing a full day's work.
3. Sometimes there is an inadequate reduction of disability.
4. The injured himself fails to recognize the need for modification of employment.
5. Failure to carry over medical treatment during the initial weeks of re-employment results in aggravation of symptoms.
6. Fear of discharge for inability to perform leads to failure. The muscles used in work may be different from the muscles injured. The statement that work is the best treatment is frequently erroneous in that the work load may be excessive and non-specific and the muscles may decompensate under the strain. On the other hand therapeutic exercises for the involved parts do not recondition the body as a whole. Therapeutic exercises build strength but not endurance. The strength and endurance required can be accomplished only by a graded programme which is specifically designed to this end. This is especially true for older workmen.

A possible solution to the problem may be a centre for treatment coupled with a centre for evaluation of capability. Distinction must be made between this proposed capability-evaluation centre and a sheltered workshop. The sheltered workshop takes a person with a fixed disability and fits him into a protective work situation. The job is predetermined on the basis of the disability. On the other hand, the capability-evaluation centre can apply the principle of the sheltered workshop plus the purpose of a medical rehabilitation centre and have as its basic purpose reduction of disability and the building of endurance, general reconditioning, and evaluation of capability.

To be effective it is imperative that the programme should encourage function of the injured parts within the limitations of those parts. There must be job disciplines which approach those of a true working situation. There must be cooperation and consideration both by and for the injured.

There are many persons who are capable of 2, 4, or 6 hours work, but not of 8 hours continuous work at productive labour. By controlling the work situation, in time and in nature, the individual's work capacity and endurance could be more effectively determined. From the psychological point of view it is important that the work should be of a productive nature, for this would demonstrate to the individual that he is capable of gainful employment. Productive work would also serve to re-indoctrinate him into a working situation.

Although it is of course impracticable to duplicate all types of occupations, nevertheless, if sufficient gradations of work level could be provided and work disciplines maintained, the programme principle would have the prospect of success.

G.M.

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

TRISERPINE

Riker Laboratories Africa (Pty.) Ltd. announce a new product Triserpine and supply the following information.

Triserpine makes available a pure, crystalline alkaloidal preparation, in exactly known and chemically assayed form, for Rauwolfia

administration without fear of depressive side-effects such as are increasingly reported from reserpine therapy.

It seems evident that such depression only occurs at long continued dosage levels over 0.25 mg. daily of reserpine, and Triserpine has ingeniously utilized the triple mixture principle to avoid the critical intake. Each tablet of Triserpine contains 0.04 mg. of

rescinamine, 0.04 mg. of deserpidine and 0.12 mg. of reserpine. As the maximum maintenance dose is 2 tablets only, the total amount of reserpine ingested remains within safe limits,^{1,2} but without any sacrifice of therapeutic activity.

Triserpine is available in containers of 25 and 100 tablets and is made in Port Elizabeth by Riker Laboratories Africa (Pty.) Ltd.

1. Smith, R. G. (1956): *Mod. Med.*, Oct., p. 18.
2. Food and Drug Administration, USA (1956): Letter to pharmaceutical manufacturers concerning reserpine dosage, October.

HEXANICITE

Westdene Products announce the introduction of Hexanicite, a new oral peripheral vasodilator manufactured by Bofors (Sweden), and supply the following information:

Hexanicite is the nicotinic-acid hexa-ester of meso-inositol. It has a mild and prolonged vaso-dilator effect which makes it ideal for the treatment of peripheral vascular disorders. Its action is directly on the contractile mechanism of the peripheral blood

vessels so that it has none of the toxic effects or side-effects of the adrenergic or ganglion-blocking agents. Nor does it cause any appreciable flushing, which is a distressing side-effect with many vasodilators.

Hexanicite is effective in both functional and organic peripheral disorders of varying aetiology. It is indicated particularly for intermittent claudication, Buerger's disease, Raynaud's disease, obstructive arteriosclerosis, acrocyanosis, diabetic gangrene and chilblains. It is also useful in migraine, in Menière's syndrome, and as an adjunct in the treatment of skin ulceration. Reports indicate that Hexanicite may be useful even in cases of long standing which have not responded to other peripheral vasodilators.

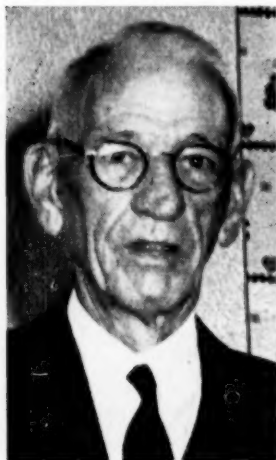
Hexanicite is available in bottles of 100 tablets of 0.2 g. The average dose is 1 tablet two or three times a day and this may be increased to 3 tablets thrice daily if necessary.

Detailed information may be obtained from the sole South African distributors—Westdene Products (Pty) Ltd., P.O. Box 7710, Johannesburg or their Cape Town, Durban and Pretoria branches.

IN MEMORIAM

GABRIEL JULIAN LUYT, M.D., F.R.C.S. (EDIN.), D.M.R.E. (CAMB.)

Dr. G. de V. Theron, of Worcester, writes as follows: Dr. G. J. Luyt was born at Ceres on 25 March 1882. After matriculating there he spent a few years at the South African College before proceeding to Edinburgh University, where he qualified M.B. Ch.B. in 1906 and proceeded M.D., F.R.C.S. in 1908.



Dr. G. L. Luyt

After spending 2 years as house surgeon at Northampton, he returned to South Africa and joined Dr. Ford in general practice at Worcester. Six months later Dr. Ford died and he carried on the practice alone. He was interested mainly in surgery and performed many operations in private houses on the kitchen table, his wife often acting as his assistant or anaesthetist. It was largely due to his efforts that the Worcester Cottage Hospital was built. It was opened in 1914, after which his work was mainly centred there. He was most conscientious and competent in his work and he rapidly built up a

large practice and became the recognized consultant for Worcester and the surrounding districts. By means of his advice and the high standard he set he had a very marked influence in raising the standard of general practice in his area.

In 1919 he was joined in practice by Dr. C. A. van der Merwe; this partnership was dissolved in 1922. In 1921 he again went to England and qualified D.M.R.E. at Cambridge. On his return he became the radiologist for the Worcester area.

He often acted as Honorary Superintendent of the Worcester Hospital and in 1950 he was appointed the first part-time salaried Superintendent.

In later years he relinquished his general practice but carried on as a consultant until 1954, when failing health caused by attacks of cerebral thrombosis forced him to retire from practice altogether. His outstanding services to medical practice in South Africa were recognized by the Medical Association of South Africa in 1956, when he was elected an Emeritus Member. His health deteriorated steadily and on 15 December 1957 he died in the hospital where he had worked for so many years.

In 1909 Dr. Luyt married Miss Mary Lilian Irving, a nurse at Edinburgh Infirmary. She died during the influenza epidemic in 1918 leaving him with four young sons, the two oldest of whom qualified in medicine, the third took up farming, and the youngest was killed in 1942 during World War II. His eldest son joined him in practice in 1938; the second son died in 1950 while Medical Superintendent of Standerton Hospital. His only sister died a few years ago, but he is survived by his three younger brothers, the rugby Springboks John, Dick and Fred. He himself was a very keen sportsman and played cricket for Scotland against South Africa. For many years he was one of the stalwarts of the Worcester cricket team. He was a foundation member of the Worcester Golf Club and was later elected a life member.

After a funeral service in the Dutch Reformed Church attended by many old friends and patients he was laid to rest in the same grave as his wife, who had predeceased him by nearly 40 years.

JOHN DRUMMOND M.D., F.R.C.P. (EDIN.)

Dr. A. Bloom of Durban, writes: Dr. John Drummond was born in 1884 in the town of Napier, New Zealand. He was educated at the Napier High School and was awarded a gold medal as dux of the school. In 1905 he proceeded to Edinburgh University and graduated M.B. Ch.B. in 1910 and as a student won the Allan scholarship in Medicine and Surgery. He took the M.D. degree in 1913 and later the M.R.C.P., and was finally elected a Fellow of the Royal College of Physicians, Edinburgh, in 1924.



Dr. John Drummond

Although an outstanding student, his ability was not confined to academic attainments for he captained the University team at cricket and played rugby for Galashiels, a tough South of Scotland side, and was selected for the Scottish trials; he was also selected to play cricket for the Gentlemen of Scotland.

After graduation he held resident appointments in the Royal Infirmary, Edinburgh, one of his chiefs being Sir Thomas Fraser, a teacher and disciplinarian of great renown, from whom

he learnt exactness of clinical methods and purity of language.

In 1913 he came to Durban as a partner in a large general practice. At that time there were no consultants in Durban and consulting services both to the public and the hospitals were provided by general practitioners. He was elected to the staff of the Addington Hospital and gradually there was an increasing demand on the part of his colleagues for his services as a consultant and, as conditions of practice changed, he eventually had to give up his general practice and confine himself to consulting work. He hated the idea of giving up family practice for at heart he was a general practitioner and enjoyed the close doctor-patient relationship that only this type of practice gives in full degree.

On retirement from the Addington Hospital he was the Senior Physician to the hospital and was appointed Consulting Physician.

He married Florence Green, who survives him, and there are three children of the marriage—two daughters and a son, Dr. Kelman Drummond, who is a physician practising in Durban.

Dr. John Drummond went to Europe with the South African Expeditionary Force in World War I and served in France and England. He was mentioned in despatches. In World War II Durban was the port to which large numbers of casualties were evacuated from the North and once again he put on uniform as a consultant.

All through his career he took a great interest in the affairs of the Medical Association and held many offices, including the Presidency of the Natal Coastal Branch, these culminating when he had the honour of being unanimously elected President of the South African Medical Congress in 1946. He gave his services freely not only to the administration of medicine, but also to the country of his adoption and served on many committees and commissions in the Province of Natal. He was most interested in the non-European Medical School of Natal University and put in a great deal of spare work, especially when it was in embryo. He contributed to medical literature in general medical subjects in journals both in South Africa and overseas.

It was not in Drummond's make-up to retire and, although he was in poor health for some time, he bore his disability with great fortitude and carried on with his work and his pastime of racing.

Jack Drummond and I were students together and, as the years went by, a close friendship developed between us. His life was given up to medicine and one felt his qualities would have left a great influence on the student if he had been a professor in a university instead of a hard-working practising physician. These qualities, of wide learning, culture, dignity and sense of duty, not only made him a leader of South African medicine, but set the profession an example to follow.

That he was well thought of by the profession was evidenced by the number of his friends, by the way his colleagues sought his

opinion and by the many high administrative honours and positions to which they elected him. It was not only the profession who thought well of him; I can do no better than quote the columnist *Wayfarer* of the Natal Daily News:

"Some years ago I was asked... to give evidence before the Natal Provincial Hospitals Commission. As a layman I was reluctant to appear before a body comprised largely of distinguished medical men... rarely have I been accorded a more courteous and attentive hearing, but it was Dr. Drummond who gave lasting memories of the occasion. Leaning forward to thank me, he made me feel that I had contributed considerably to a problem that had been troubling him.

"His questions were searching but were put with an almost solicitous courtesy; he had that rare attribute of being able to break down the barrier which so often exists between layman and medical man. In the discussion (and there were some contentious points) he made me feel that I was meeting him and his colleagues on common ground.

"That was the kindness and bigness of Dr. Drummond. There are many, many who have great cause to mourn the death of a beloved physician and a great sportsman".

With Drummond all that concerned the profession of medicine concerned him; it was his greatest interest in life. Blessed with a retentive memory, a logical mind and intellectual discrimination, he was also an omnivorous reader. He kept abreast not only of the ever-advancing knowledge of medicine but also of current world affairs.

When he first came to Durban he carried on with his rugby and played for Natal and later became a referee. He retained his love of sport and could always be seen at an important rugby or cricket match. In his later years horse-racing became one of his pleasures. He was a steward of the Clairwood Racing Club and also a member of long standing of the Greyville Turf Club. He was, perhaps, more interested in the breeding of racehorses than in the betting, but enjoyed a modest wager. It was while on a racing holiday at Cape Town that he suddenly passed away.

Jack Drummond has left his imprint on the soil of South African Medicine; somewhat a statesman, partly a philosopher, and always a good fellow, his type are hard to find.

The funeral, which took place at the Durban Crematorium on 27 January 1958, was attended by 700 people. The service was conducted by Rev. H. F. Yule, who delivered a moving and inspired address on the life and character of Dr. Drummond, whose friend and patient he had been. The chief mourners were Dr. J. Kelman Drummond (son) and Mr. R. R. Yuill (son-in-law); and the pall-bearers were Mr. J. Bradley, Mr. D. Short, Mr. P. Short, Mr. K. Hedley, Mr. D. Franklin, and Mr. S. Hedley—all relatives.

OFFICIAL ANNOUNCEMENTS : AMPTELIKE AANKONDIGINGS

MEDICAL AID SOCIETIES

The Northern Association of Medical Aid Societies has drawn attention to the growing practice of many practitioners of rendering accounts direct to medical aid societies, which is causing considerable difficulty to a number of societies in the Transvaal.

Accounts should be sent to the member concerned except in the case of those few societies which make specific arrangements to the contrary. As a rule, members of societies have to sign the doctors' accounts or the claim forms to which the accounts are attached before submitting them as claims. It is only when amounts remain unpaid that the fourth monthly account should be forwarded to the society with the appropriate comment thereon, as set out in the paragraphs at the end of item 2 of the General Preamble to the Tariff Book.

L. M. Marchand,
Associate Secretary

Medical House
Cape Town
19 February 1958

MEDIESE HULPVERENIGINGS

Die Northern Association of Medical Aid Societies het die aandag bepaal by die toenemende gebruik van talle geneeshere om rekenings direk aan mediese hulpverenigings te lewer. Dit veroorsaak heelwat moeilikheid by 'n aantal verenigings in die Transvaal.

Rekenings behoort aan die betrokke lid van die hulpvereniging gestuur te word, behalwe in die geval van daardie geringe aantal verenigings wat bepaalde reëlings vir die teenoorgestelde getref het. Gewoonlik moet lede van hulpverenigings die geneeshere se rekenings of die eisvorms waaraan die rekenings geheg word, teken, voordat hulle die rekenings as eis indien. Dit is alleenk as rekenings onbetaald bly dat die vierde maandelikse rekening, met die passende aanmerking daarop, na die hulpvereniging gestuur moet word, soos dit aan die einde van item 2 in die General Preamble van die tariefboek uiteengesit is.

L. M. Marchand
Medesekretaris

Mediese Huis
Kaapstad
19 Februarie 1958

VACANCY—ASSISTANT EDITOR

Applications are invited from medical practitioners for the post of Assistant Editor in the service of the Medical Association of South Africa at its Head Office in Cape Town.

The salary scale attaching to the post is £1,250 × 50—1,750 per annum, plus an annual cost-of-living allowance of £176 for single men and £352 for married men. The commencing salary will be determined according to experience.

The successful applicant must contribute to the Association's Superannuation Fund. He will also be expected to assume duty as soon as possible after appointment.

Applications must reach the Secretary, Medical Association of South Africa, P.O. Box 643, Cape Town, before 31 March 1958.

A. H. Tonkin
Secretary

Medical House
Cape Town
24 February 1958

VAKATURE—ASSISTENT-REDAKTEUR

Aansoeke word van geneeshere ingewag vir die betrekking van Assistent-Redakteur in diens van die Mediese Vereniging van Suid-Afrika, by die Hoofkantoor te Kaapstad.

Die salarisskaal aan die pos verbonde is £1,250 × 50—1,750 per jaar, plus 'n jaarlikse duurtetoelag van £176 vir 'n ongetroude en £352 vir 'n getroude man. Die aanvangssalaris sal volgens ondervinding bepaal word.

Die suksesvolle kandidaat moet by die Vereniging se pensioenskema aansluit. Hy sal ook verwag word om so spoedig moontlik na aanstelling diens te aanvaar.

Aansoeke moet die Sekretaris, Mediese Vereniging van Suid-Afrika, Posbus 643, Kaapstad, bereik vóór 31 Maart 1958.

A. H. Tonkin
Sekretaris

Mediese Huis
Kaapstad
24 Februarie 1958

PASSING EVENTS : IN DIE VERBYGAAN

Dr. T. St. Vincent Buss, of Cape Town, has been elected a Fellow of the Royal College of Obstetricians and Gynaecologists.

* * *

Research Forum, University of Cape Town. A meeting of Research Forum will be held on Wednesday 5 March at 12 noon, in the A-Floor Lecture Theatre, Groote Schuur Hospital, Cape Town. Dr. W. P. U. Jackson will speak on Sex Reversal.

* * *

Red Cross War Memorial Children's Hospital, Rondebosch, Cape. Monthly Postgraduate Seminar Series. On Wednesday 5 March 1958 at 5 p.m., in the Lecture Theatre of the Hospital, Dr. G. B. Beinart, of the Cape School of Cerebral Palsied Children, will speak on 'Some Aspects of Cerebral Palsy'.

* * *

Mr. P. G. Large, M.S. (Lond.), F.R.C.S. (Eng.), 1007 South African Mutual Building, Gardiner Street, Durban, having been awarded a Fellowship in the Department of Surgery, University of Melbourne, for 1 year, will be leaving for Australia on 30 March 1958. During his absence, Mr. E. M. Barker, F.R.C.S. (Eng.), specialist surgeon, will act as his locum tenens.

* * *

The South African Paediatric Association. The Cape Town Sub-group of this Association will hold its next meeting on Tuesday 4 March 1958 at 8.15 p.m. in the Lecture Theatre, Red Cross War Memorial Children's Hospital, Rondebosch, Cape. Dr. B. J. Kaplan of the Department of Social Medicine, University of Cape Town, will speak on 'Family Aspects of Paediatric Practice'.

* * *

Workmen's Rehabilitation Centre, Cr. Esselen & King Georg Streets, Hospital Hill, Johannesburg. The next Clinical Meeting will be held on Tuesday 11 March 1958 at 5.15 p.m. in the Gymnasium. Mr. W. T. Ross, F.R.C.S. will speak on 'Tendon Transplant for Deltoid Paralysis', and Mr. W. Girdwood, F.R.C.S. on 'Compound Fracture resulting in Acute Trauma and the use of plastic measures'. All medical practitioners are invited to attend and join in the ensuing discussions.

* * *

Course in Clinical Psychology, Johannesburg. The Medical Graduates Association of the University of the Witwatersrand intend repeating the postgraduate course in Clinical Psychology which has been so extremely popular during the past 2 years. The course consists of fortnightly lectures held throughout the year at Tara Hospital, Johannesburg. Those interested should communicate with the Secretary, Medical Graduates Association, Medical School, Hospital Street, Johannesburg, telephone 447040 (mornings).

The College of Physicians and Surgeons of South Africa. An Extraordinary General Meeting of the College will be held at 409, Medical Centre, Heerengracht, Cape Town, on 5 March 1958 at 5.15 p.m., when certain draft resolutions dealing with the proposed change of name of the College and the proposed extension of the period within which persons may apply for membership of the College as Associate Founders, will be submitted for adoption. Founders, Associate Founders and Fellows unable to be present may vote by proxy provided proxy forms duly completed are returned to the Honorary Registrar at 409, Medical Centre, Heerengracht, Cape Town, before the time for holding the meeting.

* * *

Union of South Africa. Department of Health. Notification of formidable epidemic diseases and poliomyelitis in the Union during the period 7-13 February 1958.

	Poliomyelitis				
	Eur.	Nat.	Col.	As.	Total
Transvaal ..	3	1	—	—	4
Cape Province ..	1	1	2	—	4
Orange Free State ..	—	—	—	—	—
Natal ..	1	1	—	—	2
Totals ..	5	3	2	—	10

<i>Local Authorities</i>					<i>Eur.</i>	<i>Non-Eur.</i>
<i>Transvaal:</i>						
Edenvale Municipality ..	..	U	—	1	—
Germiston Municipality ..	..	U	1	—	—
Pietersburg District ..	..	R	1	—	—
Roodepoot/Maraisburg Municipality ..	..	U	1	—	—
<i>Cape Province:</i>						
Cape Town Municipality ..	..	U	1	—	—
Grahamstown Municipality ..	..	U	—	1	—
Oudtshoorn Divisional Council ..	..	R	—	1	—
Phillipstown Divisional Council ..	..	R	—	1	—
<i>Natal:</i>						
Durban Borough ..	..	U	1	—	—
Ixopo District ..	..	R	—	1	—
U—Urban R—Rural						

Plague, smallpox. Nil.
Typhus Fever. Cape Province: One (1) Native case in the Glen Grey District. One (1) Native case in the municipal area of Steynsburg. All precautions taken.

Caltex Library of Medical Films. This library now includes a number of valuable films which have been completed in collaboration with well-known surgeons and have been found most instructive and useful by members of the medical profession. The purpose of the film library is to help the practitioners in country areas as well as surgeons in the cities.

Any medical practitioner proposing to screen films from this library in public should obtain permission in writing from the local Branch of the Medical Association of South Africa and then approach the nearest Caltex office not less than 2-3 weeks before the intended shows. The films should be returned promptly with a screen report; blank forms for this will be supplied with the films.

The library consists of the following 16-mm. sound-colour

surgical films: (1) Pericardiectomy, (2) Valvotomy for Mitral Stenosis, (3) Segmental Resection of the Lung for Infected Hydatid Cyst, (4) Thoracoplasty and Apicolysis for Pulmonary Tuberculosis, (5) Theatre Technique.

Prof. J. F. Brock, Department of Medicine, Medical School, Observatory, Cape, holds the following two medical films and handles their distribution: (1) Coronary Heart Disease amongst Cape Town's Racial Groups, (2) Comparative Inter-racial Medical Research.

Next month the following new films will be added to the library: (1) Inguinal Herniorrhaphy, (2) Gastrectomy, (3) Circulation and Respiration in the Giraffe.

REVIEWS OF BOOKS : BOEKRESENSIES

HOSPITAL IN THE BUSH

Hospital in the Bush. By E. W. Doell. Pp. 216. 9 Illustrations. 18s. net. London: Christopher Johnson Publishers Ltd. 1957.

Contents: Introduction. A Disgruntled Doctor. Back in the Bush. A Site for a Hospital. Organization. Consolidation, Expansion. Friends and Enemies. Life in an African Village. Fellow Workers. Some Patients. The Year of the Plague. The Last Year at Thomba.

It is a well known fact that many authors attain dazzling heights with their first efforts but with subsequent work sink into obscurity. Fortunately, this cannot be said of the Cape Town born author, writing under the name of E. W. Doell.

In his book, 'Doctor Against Witch Doctor', he vividly described a stone wall of ignorance, with which, the modern medical man finds himself confronted, when he tries to bring the healing art to the uncivilized African. The story is continued, and in his usual crisp, clear style he chronicles the growth of a modern, up-to-date hospital, complete with water laid on from a nearby river, electricity and an X-ray plant—all a one man show.

The book not only appeals to the medical man, however. Geographically, the description of the virgin bush he had to penetrate, equals that in the travels of Livingstone. The book also contains much that is of interest to the hunter, farmer and humanitarian. The two lion stories are unique, especially where he relates the incident of the thirsty lion who enjoys a drop from the lorry radiator so much that he refuses to budge from under the vehicle, and the description of the ravages of an African drought and of the misery it entails, cannot be surpassed.

The narrative of the outbreak of plague is very vivid. Throughout the pages of this absorbing book there merges the character of the author—essentially and firstly a doctor, a true follower of Aesculapius, trying to live out the oath of Hippocrates. He is a practical idealist and philosopher and in the course of following in the footsteps of the great Healer who taught us to heal the sick and to preach the gospel, has developed the essential attribute, so sadly lacking in many present day institutions, namely tolerance.

Without stating it in so many words, however, the conclusion makes sad reading. A fine man has sacrificed his health in order to bring Christianity to the African. The White Man's medicine combated disease, reduced the death rate, relieved suffering, but it also introduced the so-called civilization.

Tracks to the hospital opened up a regular bus service, followed by a store and recruiting labour station, and this was followed by the so-called civilized Native who exploits his fellows in the kraal, and introduced those other 'blessings' namely, syphilis, tuberculosis, alcohol and, inevitably, dishonesty in order to get hold of the White Man's trappings. The flower of gratitude blooms but very seldom in the mission field, and the lost soul that is really saved, is a *rara avis*.

The author however optimistically takes a long view and refuses to be depressed, admitting all the same that it will still take a few generations to really civilize the aboriginal Native. On the whole, this is an exceptionally good book to read; it is on a par with, and in some parts better than, some of the works of other doctor-authors, such as Sutherland, Brett Young, Cronin etc. The hunter, pioneer, the public-health worker, the doctor and the missionary will all not only enjoy reading 'Hospital in the Bush',

but, will also learn a lot by doing so. Personally, the reviewer is looking forward to the next work by our colleague. W.P.S.

INJURIES OF THE HAND

Injuries of the Hand. By Ronald Furlong, F.R.C.S. Pp. vii + 215. 99 Illustrations. 36s. net. London: J. & A. Churchill Ltd. 1957.

Contents: Introduction. 1. Relevant Surgical Anatomy. 2. Technical Matters. 3. Injuries of the Skin. 4. Infections of the Hand. 5. Injuries to Tendons. 6. After-treatment and Complications of Reparative Tendon Surgery. 7. Injuries to Nerves of the Hand. 8. Post-traumatic Disabilities. Index.

Books devoted entirely to the surgery of the hand are appearing more and more commonly, largely because of the new interest which has been brought to the subject by the changing surgical concept of the hand. From being a rather complicated area of small and detailed anatomy with neat spaces and boundaries serving both to guide and limit the spread of infection, the hand today has a live functional surgical anatomy in which the flexion creases of the skin and the course of the digital nerves are as important as are the details of the synovial sheaths and their reflections.

This present volume attempts to present this newer concept in a practical and straightforward manner and succeeds in conveying to the reader that the surgical importance of the hand today lies in the preservation of its function. It makes no claim to cover the subject in its entirety and avoids all reference to the more complicated reconstructive procedure such as pollicisation of a digit or the construction of opposition digits. It is not intended for the specialist in hand surgery, but for the Casualty Officer or general practitioner who finds himself commonly faced with injuries of the hand.

The chapter devoted to infections of the hand, although claiming to present a more modern and functional approach to hand infections, is in fact the teaching of Kanavel, and this section could well have been reduced to devote space to an important aspect of hand injuries which is virtually not mentioned, viz. methods of splintage and especially those which are being used today for the re-establishment of joint mobility.

With the section on elective amputations, many surgeons will take issue. For example, amputations through the metacarpophalangeal joint are roundly condemned as being 'unsightly and undesirable because of the inevitable gap which remains between adjacent digits, so that the hand can never be used to contain small objects'. It is widely held by surgeons today, however, that finger amputations cannot be reduced to rules, but must be based on individual considerations. Finger amputations at cosmetic sites are best performed only if so requested by the patient after a period of trial, for whereas patients of a certain social status and occupation might desire cosmetic results above all else, there are many skilled workers to whom the small stump of a finger proves very important, while to a heavy labourer who requires a powerful grip, a broad hand is essential.

In general, however, the book adequately covers the immediate and late treatment of hand injuries and gives detailed instructions for the treatment of tendon, nerve and bone and joint injuries of the hand. Moreover, it is well written, clearly illustrated and pleasingly printed and presented. T.L.S.

CORRESPONDENCE : BRIEWERUBRIEK

TOLBUTAMIDE IN DIABETES

To the Editor: The publication in your *Journal* of further clinical trials with Tolbutamide (D 860) in South Africa^{1,2} as well as the commentary in your editorial³ is certainly a most welcome contribution to the general effort for the evaluation of this new anti-diabetic drug, which has now withstood the test of more than 3 years' use in general practice. One of the British workers with D 860 passed the following verdict: 'Few other drugs can have had more extensive trials to ensure their safety'.⁴

As the representative of the original manufacturers of D 860—Farbwerke Hoechst A. G. (Rastinon)—I should be grateful if you would give room in your *Journal* to the following reflections as arising from your various contributions.

1. In your editorial the sequence in which you quote the different preparations is somewhat misleading and certainly does not do justice to the true historical position. Rastinon, though closely associated with Artosin through the scientific cooperation between Farbwerke Hoechst and Boehringer-Laboratories, was originally discovered by Farbwerke Hoechst, and was the first one to be introduced and registered in South Africa. Orinase is only available in the USA.

The same remarks would apply to the headline of Dr. Jackson's article.² In the Durban Medical Congress brochure, where a synopsis of his paper was published, the names were quoted in the historical sequence.

2. You state: 'There is little doubt, however, that it (carbutamide) was a somewhat more potent blood-sugar-lowering agent'.³ In all the published literature that has been made available to me (the number of publications on D 860 and BZ 55 has passed the 600 mark), I have found little evidence to prove your point.

'In clinical practice, both preparations appear to have identical actions, though the repository effect of BZ 55 is more pronounced'.⁵ In fact, there is no appreciable difference in the maintenance-dose of the two preparations.

Mehnert⁶ found that patients could be changed from one preparation to another on the same maintenance-dose and without imbalancing their metabolic situation. He emphasizes, however, the better tolerance of D 860, as compared with an undesirable bacteriostatic effect of BZ 55 on the intestinal flora, particularly against *E. coli* strains.

Professor Dunlop, in a personal communication (symposium, Frankfurt, February 1957), reported that his patients' metabolic reaction after D 860 and BZ 55 was the same, though D 860 was occasionally required at slightly higher doses.

3. DBI, to which you refer,³ is the test-name for a guanidine-derivative (phenylmethyl- or aethyl-formamidinylimino-urea), identical with PFU, another test name, whereas the experimental designation is PEDG (phenyl-aethyl-diguanidine). It can be seen from this that 'imino-urea' is nothing else but diguanidine. The new preparations therefore do not represent a novelty, for guanidine and its derivatives (synthalin) were in use long ago as antidiabetic agent: because of their marked hypoglycaemic effect, but have been abandoned owing to their equally pronounced toxicity (B-cell damage, acute yellow liver-atrophy). Two of the workers with the new substances (Krall and Williams) agree that in order to obtain a satisfactory therapeutic index the molecular structure will have to be changed with a view to reducing the number and severity of side-effects.

4. 'Tolbutamide does not lower the serum cholesterol in diabetics'.⁷ Contrary to your statement, the following observations represent the alternative viewpoint (for discussion of course):

'In 4 of 6 diabetic cases the serum-cholesterol level dropped sharply during the first week in which BZ 55' (same metabolic reactions as with D 860) 'was administered'. The authors raise the question whether the preparation has a significant effect on the intermediary metabolism.

As a result of a study of the behaviour of the blood-lipids under D 860, Boehle, Pfeiffer *et al.* found that 'there was a statistically significant fall in total lipids and total cholesterol during the first 4 weeks of treatment in all patients who responded to D 860'.⁸

5. In the article of Drs. Schneider, Lopis and Politzer,¹ where it reads, 'Allergic skin rashes, gastro-intestinal symptoms, leucopenia and thrombocytopenia',⁹ have been reported' the references^{5, 6} quoted are somewhat misleading as they have no bearing on tolbutamide, but deal exclusively with BZ 55. Thrombocytopenia, particularly, has never been reported with tolbutamide.

The absence of any lasting toxic effect of D 860 upon the white blood cells (leucopenia with subsequent affection of the granulocytes, platelets and reticulocytes) is explained by the important difference in molecular structure which makes BZ 55 a true sulphonamide (with bacteriostatic effect) and tolbutamide not, but only a 'sulphonamide-derivative'. Some have classified it as a 'urea-derivative'. 'Tolbutamide is not a sulphonamide'.⁹ Likewise, I feel that 'severe leucopenia' (p. 152, col. 2, par. 4) is perhaps a fallacious conclusion on the part of the authors,¹ for leucopenic conditions often associated with diabetes may be taken for leucopenic reactions (as also with anaemias). An 'abnormally' low white-cell count may be normal for a person without manifest signs of illness. It is true that transient leucopenias have been observed under D 860 but have, as Schneider *et al.* report,¹ usually disappeared under continued therapy. It is also true that about one-third of a large number of persons examined by Fleischhacker were found to have 'abnormally' low white-cell counts.¹⁰

6. Maintenance therapy with tolbutamide is recommended by the manufacturers at the lowest effective maintenance dose. This may be one or even half a tablet and successful treatment at this ratio has been brought to the writer's knowledge in many instances. It usually suffices, then, to administer tolbutamide once a day, say in the morning after breakfast. This remark is made as against Dr. Jackson's statement that 'tolbutamide is less cumulative and should be given in divided doses two or three times daily'.²

A. Prinz

Scientific Adviser, Farbwerke Hoechst
A. G. (Hoechst S.A./Pty./Ltd.)

c/o Newport Trading Corporation (Pty) Ltd.

P.O. Box 1871, Johannesburg

15 February 1958

1. Schneider, Lopis and Politzer (1958): S. Afr. Med. J., 32, 149 (8 February).
2. Jackson (1958): *Ibid.*, 32, 153 (8 February).
3. Editorial (1958): *Ibid.*, 32, 147 (8 February).
4. Butterfield (1957): Brit. Med. J., 2, 327.
5. Mellinshoff (1956): Med. Klin., 51, 1497.
6. Mehnert (1956): Dtsch. Med. Wschr., 81, 1325.
7. Munro and Murray (1956): Lancet, 2, 1085.
8. Boehle *et al.* (1956): Dtsch. Med. Wschr., 81, 823 and 887.
9. Butterfield *et al.* (1957): Brit. Med. J., 2, 327.
10. Fleischhacker (1956): Vienna, Almanach für Ärtz. Fortbildg., p. 174.

WITHHOLDING OF WATER BY URBAN BANTU MOTHERS

To the Editor: I was interested in Dr. Ruskin's letter¹ on this subject which appeared in the *Journal* of 8 February 1958. In a large paediatric Bantu practice of both backward and non-backward mothers, I have not encountered any difficulty in getting parents to give fluids. In general, I find the African obedient and cooperative when it comes to carrying out treatment.

My stock advice is, 'weak black tea, with a little salt, say a half-teaspoonful to a big glass of weak black tea, and lots of sugar so that it tastes nice'. I do not confuse them with talk of lemon drinks or barley water, or egg-white water. Tea seems to be universally available and even the most stupid know how to make it.

Following the recent trends from Johannesburg, I have been pushing skimmed milk and plain milk sooner than I used to and the results seem to be only good.

To the reluctant mother I explain that water is necessary 'to wash out the poisons'. This is well understood and the fluids are enthusiastically given.

In the same way, when one is shown a child with some acute illness and the parents volunteer the diagnosis of worms, I hasten to assure them that all the children have worms and that 'worm poison' can only be given to a healthy child; if given to a sick child, it will poison the child as well as the worms.

L. Albert

7 Carter Road
East London
14 February 1958

1. Ruskin L. (1958): S. Afr. Med. J. 32, 176.

ALEXANDRA TOWNSHIP

To the Editor: A circular has recently been sent by the Medical Superintendent of the Alexandra Health Centre and University Clinic, asking all Wits graduates who have benefited from the

Clinic for a donation of £1. The letter mentions that last year the Clinic incurred a deficit of over £500, which this year will be even more owing to the outlay of large sums for building extensions.

I wonder whether the private practitioners, Wits graduates or otherwise, trying to earn a living in Alexandra Township, are willing to contribute towards their own downfall by paying for the privilege of being gradually and systematically squeezed out of their practices through the continuously increasing activities of the Clinic. Nobody considers their deficit, for each expansion of the Clinic causes a decrease in the number of private patients, which has been reduced to a mere trickle. And these doctors, some of them of long standing and experience, cannot rely on street collections, Rag days and bequests from benevolent citizens to provide them with elaborate waiting rooms, ultra-modern equipment and cars and station wagons.

It is well known that the attitude of the Clinic towards the private practitioners is that of near non-cooperation, to say the least. But a way should be found to utilize the services of these doctors, who have to live and to support their families, for mutual benefit and not the sole benefit of the Clinic.

Deficit

14 February 1958.

MEDICAL BULLETINS

To the Editor: I shall be glad if the following statement could be published by you in your *Journal* for general information:

The S.A. Medical and Dental Council has noted that S.A.P.A. has stated:

'The regulations of the Medical Council hitherto forbade bulletins, but the Council has decided that doctors attending people occupying high public positions may associate their names with bulletins.'

The statement is incorrect. The Council has not considered the matter, has taken no decision in connection with it and the regulations have not been amended in any way.

Wm. Impey
Registrar

South African Medical and Dental Council
P.O. Box 205
Pretoria.

22 January 1958.

KORONÊR AS SIMPTOOM VAN KRONIESE MAGNESIUMTEKORT

Aan die Redakteur: Laat my as algemene praktisyn en sonder die volledige beskikbare gegewens toe om te spekuleer i.s. die etiologie van koronêrtrombosie.

Die gegewens wat ek het is die volgende:

1. Groot en ryk eters is meer geneig tot koronêr;
2. Karige eters minder so geneig;
3. Viseters minder geneig tot koronêr;
4. Haastige lewenstempo vermeerder kanse tot koronêr;
5. Vet Italianers minder geneig tot koronêr vanweë hul oorwegende olie en systeldiet;
6. Olies in die diët verlaag bloedkolesterol—soos deur Bronte-Stewart *et al.* bewys;
7. Eskimos leef \pm 8 maande op spek en is koronêr-ongeneig;
8. $MgSO_4$ -inspuitings verminder soms angina pectoris;
9. Hoë persentasie Amerikaanse Korea-soldate van \pm 22-jarige ouderdom wys reeds arteriële degenerasie.

In almal hierdie skyn magnesium die gemene faktor te wees. In die see, dus ook in sy produkte, is daar genoeg daarvan vir menslike konsumpsie; gesien sy oplosbaarheid kan daar op land maklik 'n tekort wees, dus in die gras, groente en karkasse van diere wat uitsluitlik op landkosses leef. Die mens wat relatief oud word, ondervind die manifestasie van hierdie kroniese tekort as koronêr.

Bgn. gegewens sal dan as volg sorteer:

Genoeg Mg: Nos. 3, 7 en 8 met 'n relatiewe 2 en 'n sekondêre 5 en 6;

Tekort aan Mg: 1 met sekondêre 4.

Dus dan, met genoeg Mg sal mens harde vette kan eet, vinnig leef en as daar geen gebrek in die Mg-metabolisme is nie, geen koronêr ontwikkel nie.

Met 'n tekort sal daar relatief genoeg wees as die kolesterol-inname beperk is (No. 2) of as klaarbereide onversadigde vette saam met die oormaat kolesterol ingeneem word (Nos. 5 en 6). As geen sulke olies teenwoordig is nie, is daar kroniese neerslag van oormaat kolesterol in slaagaar-wande en die proses word verhaas deur 'n vinnige lewenstempo.

No. 9 lyk my interessant omdat dit 'n kroniese patologie aandui wat goed pas by bgn. kroniese Mg-tekort-idee.

Spekulatief kan die werking van Mg-ensiemies wees by die omvorming van harde vette na olies of miskien by die metabolisme van vetsure.

Dit sal nogal 'n lekker speletjie wees om die verband tussen Mg en bloedkolesterol te probeer vasstel.

Intussen raai ek my pasiënte aan om gereeld bietjies engelse sout te neem.

Posbus 29
Prins Albert
13 Februarie 1958

J. M. van der Westhuyzen

THE AGE OF THE FOETUS

To the Editor: The attention of the Council of this Society has been drawn to a letter in your issue of 1 February from Prof. D. Crichton, commenting on your editorial of 11 January entitled 'The Age of the Foetus', in which you quoted a recent article by Dr. Blair Hartley, 'Radiological Estimation of Foetal Maturity'.

Professor Crichton is quite entitled to question the value of the radiological estimation of foetal maturity or postmaturity. But my Council takes the strongest exception to his 'culminating observation' that—particularly in hands other than those of Blair Hartley and his team—radiological diagnosis of postmaturity offers to the radiologist additional work (and possibly additional remuneration) at the expense of frequent self-delusion.

This remark, implying as it does that radiologists are in the habit of examining patients purely for gain, without regard to the clinical indications, is particularly unbecoming from someone in Professor Crichton's position. My Council feels further that you, Sir, should not permit the columns of our *Journal* to be used for the publication of such smears on the profession.

F. W. McLachlan
Chairman, Radiological Society of South Africa

206 van Riebeeck Buildings
Schoeman Street
Pretoria
14 February 1958

THE AGE OF THE FOETUS

To the Editor: Many will share my disappointment in Prof. Derk Crichton's letter¹ commenting upon your editorial, 'The Age of the Foetus'.² Quite apart from the insulting remarks that he has directed at you, Sir, and at radiologists in general—his suggestion that they are keen to do estimations of foetal maturity for the money they can get out of it, is contemptuous—Prof. Derk Crichton has got his facts wrong.

This letter is intended solely to correct his facts. It is not intended as a reply to his letter which, I feel, is best ignored.

I am not sure whether he has read Dr. Blair Hartley's article³ upon which your editorial was commenting, for it contains all the answers to the points that he raises in his letter.

1. He alleges that Dr. Hartley's results are 'largely' due to his own radiological prowess or that of his team, as well as the high standard of radiography in a specialized, well-equipped unit such as, Prof. Derk Crichton apparently believes, is only to be found in Manchester. This statement is simply not true. Dr. Blair Hartley and his colleagues would be the last persons in the world to claim that they hold a premium on good radiography or radiology, and those who are acquainted with his work know that the method was first practised with success in a general county hospital in the North of England, long before the St. Mary's unit was built and long before 100 mA outputs (let alone Prof. Derk Crichton's intensification screens) were available to him. I am satisfied that it is true to say that the particular method described by Blair Hartley could be practised (and his results equalled) anywhere in the world.

2. Prof. Derk Crichton states further (a) that antenatal radiographs taken for other purposes cannot be used for foetal maturity estimations, since the results are unreliable. This, surely, was one of the very points that Dr. Blair Hartley drove home in his article. He writes, 'A specific technique for revealing foetal maturity must be planned and carried out . . .' (p. 564 of his article). It does not follow that, because the technique is a specific one, it cannot be carried out by other workers elsewhere.

(b) that estimations of foetal maturity in cases of toxæmia and hydramnios are likely to be inaccurate. Again, Dr. Blair Hartley emphasizes this very point. He writes: 'If some features suggest immaturity and some postmaturity; or if the landmarks or some of them cannot be identified, then one's estimate would be guarded . . . having in mind the possibility of some foetal abnormality such as hydrops or diabetes, craniostenosis or spina bifida, or maternal toxæmia' (p. 574).

(c) that 'radiological diagnosis . . . is beset with pitfalls, being impressionistic . . .'. Does Prof. Derk Crichton honestly believe that the laying of hands upon the abdomen of a pregnant woman to assess the height of the fundus is any less impressionistic than identifying a developed centre of ossification on a radiograph?

(d) that you, Sir, omitted to say that Dr. Blair Hartley misjudged the date of delivery by more than 3 weeks in one case out of 20 (5.5%). I wonder what statistics Prof. Derk Crichton could provide to show that conventional estimations are subject to any lesser degree of error? Recently Higgins⁴ showed that 85.1% of a large series of mothers were delivered between the 39th and 42nd weeks—implying that there was a 3-weeks error in estimation of 'term' in 14.9% of cases.

3. Despite the fact that Dr. Blair Hartley prefaced his paper by discussing the risks involved in exposing the foetus to the direct X-ray beam, and despite your faithful mention of this fact, Prof. Derk Crichton grasps at radiation hazards as a final big stick to beat the radiologist with. Of course, it is only right and proper that this subject should be discussed, but surely it is the radiologist who, by his training and the fact that he has constantly to expose himself to the risks of irradiation, is best qualified to decide upon it? Stewart,⁵ who herself suggested the possible link between antenatal X-ray examinations and leukaemia in infancy, believes that antenatal radiography is justified where there is 'a definite clinical reason for referring patients for this examination'. More recently, Witts⁶ has written: 'We must balance the risks of X-ray diagnosis and therapy against their benefits . . . The possible 50 cases of leukaemia a year from X-radiation in utero must be set against 439 deaths of mothers in childbirth, 15,829 stillbirths and 9,750 deaths in the first weeks of life in 1955 (in England & Wales). Obstetricians and radiologists believe that the mortality of mother and child may be significantly reduced by the appropriate X-ray examination in pregnancy, and that they can save more lives than are likely to be lost from leukaemia.'

I was interested to note, Sir, that your esteemed colleague, the editor of *The Lancet*, in commenting upon Dr. Blair Hartley's work recently,⁷ had materially the same thoughts as you on the subject. I am watching his correspondence columns for Prof. Derk Crichton's letter.

Edmund H. Burrows

David Lewis Northern Hospital,
Liverpool, England
13 February 1958

1. Crichton, D. (1958): *S. Afr. Med. J.*, 32, 144.
2. Editorial (1958): *Ibid.*, 32, 29.
3. Hartley, J. B. (1957): *Brit. J. Radiol.*, 30, 561.
4. Higgins, L. G. (1956): *J. Obstet. Gynaec. Brit. Emp.*, 63, 567.
5. Stewart, A., Webb, J., Giles, D. and Hewitt, D. (1957): *Lancet*, 2, 447.
6. Witts, L. J. (1957): *Brit. Med. J.*, 1, 1197.
7. Leading Article (1958): *Lancet*, 1, 249.

THERAPEUTIC ABORTION AND RUBELLA

To the Editor: The editorials dealing with scientific subjects that have been appearing in the *South African Medical Journal* within recent times have been widely appreciated, not only because of their general interest, but because of their scientific soundness. This applies to the leading article that was published on 25 January on 'Therapeutic Abortion and Rubella.'

While commenting on the fact that rubella may cause serious damage to the foetus, especially if the mother contracts it in the first trimester of her pregnancy, it is stated in this article: 'Far from malformations being inevitable after such an attack, their frequency is not even high. . . The incidence of congenital malformations among the live babies born of women with rubella during the first trimester of pregnancy was 9.7%, and in a similar study elsewhere of pregnant women who did not contract rubella the incidence was 7%,' and further 'that blanket advocacy of therapeutic abortion in pregnant women who developed rubella during the early months of pregnancy is medically unjustified'.

It is interesting to note how closely the views of the investigators whom you quote coincide with those expressed in an editorial

in the *British Medical Journal*, 8 September 1951. In this article the following was stated *inter alia*: 'Maternal rubella in the early months of pregnancy is apparently thought by some to necessitate termination of pregnancy, . . . the medical evidence can hardly be taken to justify such a course . . . If it does occur, then it is important that the anxiety, if present, of the parents should be relieved as much as possible by letting them know that they are quite likely to have a normal baby, and that, if the baby is affected, it will not necessarily be serious.'

It is regretted that your leader does not comment on the legal aspect. Gardner and Lansdowne, when discussing criminal abortion, state: 'No crime is committed in those circumstances in which an obstetrician, under the clear dictates of his science, decides that the removal of the foetus is necessary to save the life of the mother.' Recognized jurists have expressed the opinion that the old Roman-Dutch authorities undoubtedly meant by the phrase 'to save the life of the mother' that the continuation of the pregnancy would inevitably be the direct cause of the immediate death of the mother.

Although the potential crippling effects of rubella in pregnancy have been so dramatized that a great deal of rubella-neurosis has been fostered, there is no medical evidence to show that the life of the mother has in any way been jeopardized. In the light of our present medical knowledge, it would be difficult in a court of law in South Africa, where abortion is an offence at common law, to justify the performance of a therapeutic abortion, merely because a mother had developed German measles in the early months of pregnancy.

In my opinion it is important that this aspect of therapeutic abortion should be seriously considered by all medical practitioners who may be faced with this admittedly difficult problem.

R. Lance Impey
Consulting Gynaecologist, Groote Schuur Hospital

Talana Road
Claremont
Cape
20 February 1958

JOHANNESBURG MUNICIPAL BENEFIT SOCIETY: APPOINTMENT OF PART-TIME PHYSICIAN AND PART-TIME UROLOGIST

To the Editor: My Council has observed the wording of the advertisement which appeared for the above posts in the *Journal* of 8 February 1958, in which the Society referred to:

'Vacancy—Temporary Part-time Urologist

Applications are hereby invited from suitably qualified and registered Specialists in Johannesburg for appointment to the above position.

The remuneration applicable to the above position is £600 p.a. paid monthly.

The duties will be to consult and treat all patients of this Society referred to him by any other Medical Officer of the Society, within the provision of its Constitution.

This appointment will be on a purely temporary basis for a period of six months only, but may be extended thereafter for a further period as may be decided upon. A permanent appointment may be advertised at the expiration of the temporary period.

Further details can be obtained from the Senior Medical Officer or the Secretary.

Applications in writing, must be received by the undersigned not later than Friday 21 February 1958.

F. W. Buitendach
Secretary.

I have been directed to say that, at its meeting on 16 January 1958, my Council resolved only that these two appointments be approved for a temporary period of 6 months. Nothing was resolved concerning extensions of this period or of eventual conversion to permanency.

J. Gluckman
Hon. Secretary Southern Transvaal Branch,
Medical Association of South Africa

Medical House
5 Esselen Street
Johannesburg
18 February 1958